The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Enlargement of "The Chemical Age"

NEXT week, in consequence of the continuous growth of our advertisement pages, and in order to provide for a yet fuller service of original articles, special features, and current news, THE CHEMICAL AGE will be permanently enlarged by eight pages. We have been in existence rather less than six months, and the support this journal has received, and the success it has already attained, surpass our best hopes. Not a week has passed since the beginning without adding a substantial number to our subscribers, and week by week the sales increase without a check. From all parts of the country we have received messages welcoming our advent and wishing us well, and not the least cordial of these greetings have come from readers in our colonies and in America. No new journal could have wished for a more generous reception. Our cordial thanks are offered to all who have, in so many different ways, helped and encouraged our venture, and especially to those early friends who through the experimental stage and since have stood so loyally by us. Their attitude can only be explained on the ground that they believed we were out to serve the chemical industry to the best of our ability. For the future it will be our effort to make THE CHEMICAL AGE increasingly worthy of the faith our readers and advertisers have placed in us.

The Anti-Dumping Bill

THE Anti-Dumping Bill—or, to give it its official title, the Imports and Exports Regulation Bill—introduced by Sir Auckland Geddes last week, is designed to remedy a well-known grievance of the home manufacturer. Whether it will effect the remedy desired is a point about which we may expect to hear divergent opinions in the course of debate. One point is certain to be criticised—the extent to which the powers to be exercised under the Bill are placed in the hands of the heads of departments, and the total lack of provision for the direct representation of industry. Those who know anything of the friction between the Foreign Office and the Board of Trade, which resulted recently in the resignation of Sir Arthur Steel-Maitland, may imagine the difficulty of getting four Government departments—the Foreign Office, the Treasury, the Board of Trade, and the Department of Overseas Trade—to agree on any single question submitted to them. While the four are cheerfully wrangling over departmental etiquette, we are afraid the claims of the poor trader may receive scant attention. The Bill, however, is a large and important measure, affecting very directly the import and export of chemical products, and it deserves the most serious attention of all the bodies representing British chemical industry. An early opportunity should be given the members of these bodies of discussing its clauses, especially as affecting themselves, and no time should be lost in communicating their decisions to the Minister in charge of the Bill.

While the Bill will probably call for sharp criticism on many points of detail, its general aims will command wide sympathy. Its principle aims are two—the first is to check the process of "dumping"; the second to protect infant key industries and industries specially affected by depreciation of foreign currency. The object of "dumping" is generally the capture of some other nation's industry, and as a process the Germans made a thorough success of it, and above all, got to work on it before their competitors. Shortly, it consists in producing goods in great quantities, supplying first the home needs, and then swamping some foreign market with the balance at prices which attract and ultimately capture the trade of that market. It is a form of clever trade manœuvring with the object of rounding up the enemy, and this country has, no doubt, been a victim of it. To defend ourselves against it is natural, but it is important to see that the protective measures, intended

to defeat unfair competition, do not in other ways inflict even greater damage on ourselves. The only real protection of British industry lies in its power to produce more goods, and better goods, than those of other nations, and any protection which tempts British producers to be content with a lower standard of efficiency must in the end fail and damage ourselves. Another point to be remembered is that we are very large re-exporters of stuff that comes to us from all parts of the world, and this important branch of our trade must not be crippled. It is an extremely difficult thing to combine the freedom of trade we desire on the one side with the limitation of unfair competition sought for on the other, and the chemical industry will need to watch this point very keenly to see that the disadvantages are at least balanced by the new advantages of the Bill.

The Coal Conundrum

WHEN speaking fairly hopefully last week of a reduction in the cost of coal, we certainly were not prepared for Sir Auckland Geddes' sudden change of front, which has resulted in a conditional drop of no less than 10s. per ton. In fact, is is difficult to keep pace with the calculations of the President of the Board of Trade, or to understand the basis of reckoning which called for a general 6s. advance in July, followed—early in November—by a protest that no reduction could be made, and culminating this week in a sensational somersault. Even now the situation is, to say the least of it, obscure; and the variety of interpretations which have been put on the Order by the daily Press is sufficient indication of the public bewilderment.

It is quite clear, at any rate, that the domestic user (who, by the way, is responsible for consuming in the most wasteful manner no less than 40 million tons of coal per annum) is to be encouraged in his extravagance just at the time when schemes for conserving our coal resources are receiving official support, and when the Government is spending something like £200,000 on the establishment of a fuel research station, one object of which, one would imagine, is to find an alternative to the employment of the open grate. On first principles, it would seem that the policy most to the interest of the country would be to spread the £20,000 per annum reduction, which the 10s. per ton approximately represents, over the coal employed in industry and on the railways. In fact, if the domestic consumer of raw coal is to be discouraged, it would be far more reasonable to impose an increment of 10s. per ton on household coal, and to make him realise that the most economic method of acquiring heat energy is in the gaseous form. After all, he would probably be better off in the long run, for any substantial reduction in the cost of industrial and gas coal would immediately be felt by a reduction in cost of many everyday commodities. Householders, however, are voters, and this week's Order looks suspiciously like an indirect bid for the gratitude and support of those exercising the franchise.

At the moment of writing the position of the gas undertakings is by no means certain, in spite of the fact that many of the daily journals have been writing on the assumption that the 10s. reduction will apply to gas coal used for supplying gas for domestic purposes. If this is the case the householder will be relieved of something like 8d. per 1,000 cubic feet on his gas bill, but it is unlikely that any reduction can be made before the end of the year. Meanwhile, this additional penalty, if placed upon industry, will lead to some pretty complications in the accounts departments of the gas concerns.

Organization of Technical Engineers

THE Society of Technical Engineers will inaugurate its winter campaign with a meeting to be held in the Central Hall, Westminster, on December 2, when Mr. C. H. Wordingham, lately President of the Institution of Electrical Engineers, will speak. The Society was formed early in 1918; its rules have now been submitted to the Registrar for approval, in order that the Society may be formally registered as a Trade Union. The members of the Society comprise the great middle class between capital and labour in all branches of engineering—managers, assistant managers, designers, inventors, buyers, salesmen, leading draughtsmen—in short, men in the technical, managerial and administrative grades, whose interests are too often overlooked in industrial disputes, and who, it is felt, should have a voice in any National Industrial Council that may be set up for the engineering industry. Though the membership of the Society is open only to qualified men who are not engaged in purely manual work, it does not exclude scientifically trained pupils temporarily engaged in works, or men who do not possess degrees in engineering. It is intended, however, to raise the qualifications for admission gradually, so that membership of the Society will ultimately become a guarantee of professional standing. During the past year the membership of the Society has continued steadily to expand. Branches have been formed in many centres, and the members are in process of being grouped into sections according to the department of engineering which they profess. Friendly relations have been established between the Society and one or two existing sectional societies previously formed for the purpose of protecting the interests of engineers engaged in the particular branch of engineering concerned. The constitution of the Society is to make it easy for such sectional societies to establish close relations with the Society, becoming, in fact, actual sub-sectional groups within the main section of the Society, without necessarily losing their identity or power of self-government, subject to the possible subordination of the interests of a group to those of the profession as a whole. The headquarters of the Society are at 102, Belgrave Road, London, S.W. 1.

The Lead Position

STRIKES and decline in output have not been without their effect on the market for lead. In August the price of English lead stood at £26 per ton, the foreign variety fetching £1 less. To-day the home-produced metal is standing at nearly £36; with the foreign product ranging round £34 per ton for immediate sale, and well above the figure for 1920 delivery. The change in the situation since the early part of the year is remarkable. Some nine months ago there was what may be described as a superabundance of lead in the world, this being mainly held by the various Governments; and at present in this country the Government holds lead to the value of £2,400,000. To explain the rise in value a

writer in the *Times* advances the suggestion that in the earlier part of the year consumption was at a very low point so that the heavy stocks, with the expectation of a reasonable maintenance of production, were a serious menace to the market, which showed signs of being over-burdened, and prices fell heavily. Under the stimulus of lower prices consumption quickly revived throughout the world, particularly in the corroding and electrical industries, and it has assumed very large proportions. Simultaneously, owing chiefly to labour troubles, production has fallen rapidly, and with the drop assuming serious dimensions, instead of a market overburdened with supplies there are now serious fears of a scarcity.

The chief drop in production has occurred in Australia, where the Broken Hill mines have been closed down since May owing to a strike. It was originally considered that between 120,000 and 140,000 tons of Australian new production would come to this market between April 1, 1919, and March 31, 1920. Present indications are that the total will be little more than 20,000 tons, owing to suspension of production, and the heavy demands for the East. In Spain production has been greatly curtailed, and with high fuel charges and rising wages, costs of production have advanced very considerably. Prices in America are now in the neighbourhood of £35 per ton, which is equivalent to £38 10s. over here. The Government stock of lead in this country is 64,000 tons, of which about 35,000 tons may be taken to be unsold, but a very large proportion of this is not at present available. The only supplier of any consequence is Australia; and, owing to tonnage difficulties, shipments afloat from that country are small and are in fulfilment of contracts already made. The outlook suggests the necessity of replenishing supplies from America, as there are still no signs of a resumption of work at Broken Hill, and even if there were the output would be very low for some time to come. The *Times* says that the Government policy is to do everything possible to restrict exports of lead until such time as the outlook becomes clearer.

Chemical Exhibits at Glasgow

THOSE who have made a careful inspection of the chemical exhibits at the British Key Industries Exhibition at Glasgow confess to some sense of disappointment at the display made by the chemical section. One correspondent informs us that very few of the stands had any attendant when he visited the Exhibition, and that there was scarcely any attempt to call attention to the importance of the exhibits. "The exhibits themelves," we learn from one visitor keenly interested in chemical industry, "were nicely got up, but except to those 'in the know' I fear they would be of little interest. This may, of course, have been intentional, but no ordinary person visiting the Exhibition would be made aware how very important the development of British chemical and allied industries is to our national welfare." We are afraid that there is some degree of truth in this criticism. The same feeling was present in the minds of many who saw the chemical exhibits at the British Scientific Products Exhibition in London. The exhibits in detail may be good enough, but there is no combined effort on the part of the industry as a whole to represent its total weight among the industries of the country. This is rather a pity, for the public fail to realise their enormous debt to chemistry, and the industry, in public estimation, thus gets less than its due. Those "inside the know," as our correspondent puts it, understand, but to the nation at large the industry is often inadequately interpreted. We have suggested before that chemical science and chemical industry would both gain by more attention to the public point of view, and a less exclusive absorption in their own internal politics. The exhibits in London and at Glasgow are, however, a useful beginning, and by and by we may hope for a really adequate representation of the part chemistry plays in national industry.

Nitrogen Products Report

THE report of the Nitrogen Products Committee, which has been expected for some time, has not yet been issued. It is rumoured, however, that it is now ready for publication, and may be made public at any moment. It is reasonable to assume that it will be a volume of great interest, containing a mass of statistical and other information on the subject. In connection with this report two facts may be mentioned, which may possibly have no bearing on each other, but which are nevertheless interesting. The first is that the factory at Billingham-on-Tees is now for sale. The second is the report in our Patent Literature of the recent grant to Brunner, Mond & Co. of licences in respect of a number of Haber and Badische Anilin and Soda Fabric patents, all relating to the manufacture of ammonia. These facts, taken together, suggest certain possibilities.

The Calendar

Dec.		
1	Royal Society of Arts. "Synthetic Drugs." J. T. Hewitt, M.A. (Emeritus Professor of Chemistry, East London College, University of London).	John Street, Adelphi, W.C.
1	Society of Chemical Industry (London Section). "Ethyl Chloride." Albert Henning. (Illustrated by Lantern Slides). "The Influence of Impurities in Lead when it is heated with Concentrated Sulphuric Acid." Charles E. Barrs, A.I.C.	Rooms of the Chemical Society, Burlington House, Piccadilly, W.
2	"Evaporation" by H. J. Pooley (George Scott & Son (London), Ltd.)	Manchester Municipal College of Technology.
2	"Chromium Steels," by C. A. Edwards, D.Sc.	Royal Victoria Hotel Assembly Room, Sheffield.
3	Chemical Club. "The Practical Workings of a West African Gold Mine." T. Young.	Newcastle.
3	Royal Society of Arts. "The Oil Seed Crushing Industry." J. W. Pearson (Chairman and Director, British Oil & Cake Mills).	John Street, Adelphi, W.C.
4	The Chemical Society. "Di-phenanthryl" H. Henstock. "A New Surphurated Hydrogen Generator" B. D. Steele and H. G. Denhain.	Burlington House, Piccadilly, W. 1.
4	Chemical Society. Ordinary Scientific Meeting.	Burlington House, Piccadilly, W. 1.
5	Society of Chemical Industry.	Grand Hotel, Manchester.
5	Society of Chemical Industry (Bristol and South Wales Section). "The Incorporation of Amatol." E. P. Perman, D.Sc.	University College, Cardiff.

The Nitrate Industry of Chile

Notes of a Lecture by Professor F. G. Donnan, F.R.S.

In his lecture on "The Nitrate Industry of Chile," at the inaugural meeting (session 1919-20) of the Chemical Society of the Royal College of Science on November 14, Professor Donnan described the occurrence of the nitrate beds in a belt, three miles in width, which follows for 300 miles the western edge of the "nitrate plain," an arid plateau confined between the coastal range on the west and the foothills of the Andes. He passed on to the composition of the beds as indicated by the results of his own analyses:—

$NaNO_3$: 14 to 30 per cent., normally 25 per cent.
KNO_3: 2 to 6 per cent., normally 3 per cent.
NaCl: 8 to 25 per cent.
Insoluble residue (clay, gravel, and sand): 25 to 50 per cent.
Present in small amount only: $CaSO_4$ (2 to 6 per cent.), Na_2SO_4, $MgSO_4$.
Present in traces only: Borax (1 to 2 per cent.), iodate (.1 per cent.), perchlorate, chromates, vanadates, &c.

Conformation of Surface Beds

The nitrate deposits consist of four strata: (1) The superficial "chuka," a barren aeolian bed, 20 to 30 cm. in depth; (2) the "costra," a hard conglomerate (1 to 8 ft. in depth), cemented with $CaSO_4$, NaCl and $NaNO_3$, a low-grade 5 to 18 per cent. nitrate rock, now worked exclusively owing to the exhaustion of the caliche; (3) the "caliche," consisting of $NaNO_3$ (40 to 80 per cent.), NaCl, $MgSO_4$, and Na_2SO_4, and varying in thickness from a few inches to several feet; and finally the "cola," a nitrate-free argillaceous bed. It was emphasised that the original variability of the beds and the great faulting subsequently endured combine to render difficult the working of the deposits.

Mining and Factory Processes

The surface layers are loosened by blasting through the medium of crude gunpowder prepared from local nitrate, coal dust, and sulphur from the Andes; and the ground thus opened is further broken up by dynamite cartridges and hand tools. Estimating the nitrate content of the material to within 2 per cent., it is said that by observing the way in which a fragment deflagrates when dropped on a glowing tinder, the workmen select the richer material, which is then conveyed by mulecarts and light, tip-up railway carts to the crushers, which are of the Black-Marsden vibrating-jaw type. Delivered from these machines in fragments about the size of one's fist, the material, whilst small enough to make possible a fairly efficient extraction, does not liberate enough clay to puddle the tanks during the boiling and leaching operations. The material is raised to the top of the boiling tank by various methods—buckets, trucks, or endless-belt conveyers—and is distributed over the tank by means of portholes alongside light rail-tracks running on the roof; and within the tank it is flooded with water, and maintained at the boiling point for several hours by the action of a steam-heater coil.

The leaching is carried out by the counter-current method, identical with that employed in removing sodium carbonate from black-ash in the Leblanc process, save that ebullition is allowed to occur. The process is conducted in a series of eight iron tanks, of dimensions 7 ft. by 9 ft. by 25 to 40 ft., provided each with steam coil, false perforated bottom, a handpump and sidepipe, by which liquor at the bottom of the tank may be raised and passed forward into the adjoining tank, and a discharge gate in the floor for the removal of the fully exhausted material. The eight tanks form a cyclic system, and when one cycle has been completed, each tank has performed in turn the functions assigned, for simplicity, to tanks 1 to 8 respectively in the detailed description.

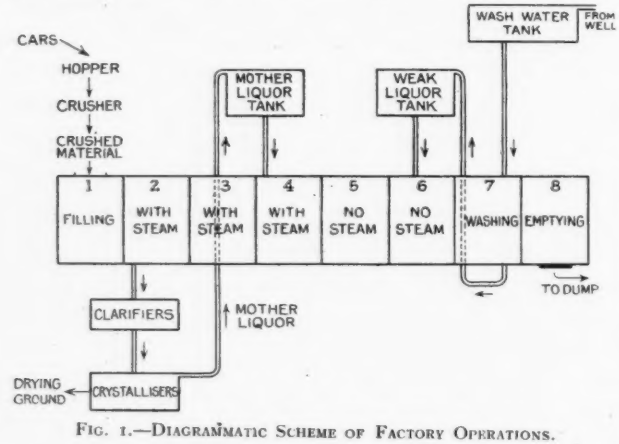


Fig. 1.—Diagrammatic Scheme of Factory Operations.

The eighth tank contains nitrate—material which, having passed through seven stages of the cycle, is fully exhausted, and awaits removal to the waste dump. Into the seventh tank, which contains material almost completely exhausted, water is passed from the wash-water reservoir, the ultimate source of the liquid being a borehole in the plain. From this seventh tank the liquor is raised to the weak-liquor tank, and thence allowed to flow into the sixth, containing less fully extracted rock. The liquor is next passed direct into the fifth, and thence to the fourth, where, meeting material progressively richer in nitrate, it becomes increasingly rich in dissolved nitrate, this concentration being aided by the fact that, from the fourth tank to the second, the steam coil is

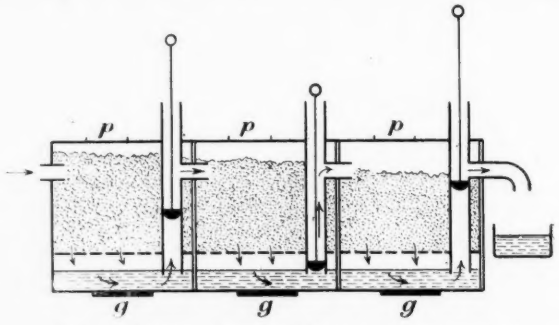


Fig. 2.—Diagram Showing Means of Circulation of Liquor. False Bottom, Pump and Sidepipe, Discharge Gate (*g*), and Charging Portholes (*p*).

thrown into play. From the fourth tank the liquor is passed into the third and second tanks consecutively, and, having at this stage attained a concentration of 50 per cent. $NaNO_3$, the liquor is run into the clarifier, where the settling of the clay carried in suspension is hastened by the addition of a small amount of flour. Thence the liquor is run to the crystallising fields, where, exposed over a period of ten days to the frigid atmosphere of the Chilean nights and protected by corrugated iron sheeting from direct sunlight in the daytime, it deposits a layer of nitrate. The mother liquor is pumped away to the mother liquor tank, and is thence allowed to pass as required into that particular tank in the series which contains liquor of similar density. The solid nitrate is shovelled out of the crystallisers and transferred to the drying ground, where, laid on the levelled floor of the plain (only occasionally concreted), it drains and dries. During the drying the amount of NaCl present is reduced from 3-4 per cent. to 1 per cent., and this is inevitably accompanied by a slight loss of nitrate by drainage, particularly when, once every six or seven years, a fall of rain bursts on the unprotected nitrate factory. Centrifugal drying, though a more economical method, has not yet been introduced into the process.

The first tank in the series is the boiling tank and the steam coils, in which steam, at a pressure of 50 lb. per square inch, condenses at about 135°, and thus gives rise to a temperature of 120° in the tank. The return watermain carries the water back by gravity-flow to the low-lying boiler, which is now predominantly of Lancashire coal-fed, low-pressure type, though, with the increasing cost of coal, Californian oil-fired boilers are being extensively substituted.

The above process is continued until, by exhaustion of the material, the liquid flowing from the second tank fails to attain the required density. At this point the seventh tank is made the

emptying tank (No. 8), the first is included in the series, and the process is resumed.

The exhausted material is first "poled" out through the discharge gate by workmen on the roof, and, when no more is capable of removal by this means, a gang of workmen enter to shovel the remainder out. It is then conveyed by light railway to the waste dump, down the side of which it is tipped, and, as the dump increases circumferentially, the rails are moved outward. Whilst the crude calculations usually made indicate a very fair extraction, analysis shows that actually but 50 to 60 per cent. of the nitrate is removed; hence the waste dumps, gigantic accumulations of 6 to 8 per cent. nitrate material, actually constitute a very valuable potential source.

Chemical Aspect of the Process

The leaching process is peculiar from the technical point of view in that impurities do not accumulate, and, far from requiring the usual periodical purging, the mother liquor is retained unchanged in circulation for over forty years. The reason is that as the nitrate liquor rises in concentration and temperature the impurities are deposited to such a degree that, on subsequent cooling in the crystallisers, precipitation is avoided. Again, as

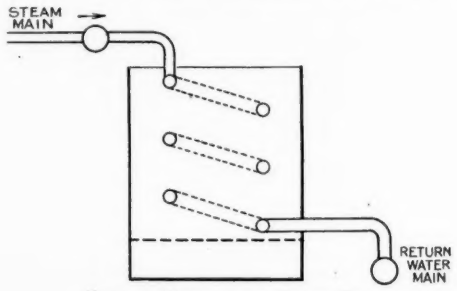


FIG. 3.—DIAGRAM OF STEAM COIL.

the liquor, which leaves the second tank saturated with salt, is allowed to cool in the clarifiers, the excess of salt comes out until 85° is reached, though at lower temperatures pure sodium nitrate is deposited. Nevertheless, just that amount of impurity which is soluble in one charge of water oscillates perpetually between the wash tank and the forward tanks.

Extraction of Iodine

An important by-process is the extraction of iodine from the sodium iodate, which occurs to the degree of 3 to 7 gm. per litre in the liquor, by the agency of sodium hydrogen sulphite prepared by the conversion of crude sodium carbonate with sulphur dioxide. Fine parts of iodate are reduced to iodide, which in turn is made to liberate iodine by reaction with one further part of iodate.

$$NaIO_3+3NaHSO_3 \longrightarrow NaI+3NaHSO_4.$$
$$5NaI+NaIO_3 \longrightarrow 3I_2+6NaOH.$$

The precipitated iodine is allowed to settle in wooden tanks, the liquor is removed, and the iodine sludge is run into calico bags and freed from liquid by compression. The iodine-cakes thus obtained consist of iodine (70 to 80 per cent.), $CaSo_4$, boric acid, silica, and volatile organic matter from the coal used in the formation of the crude soda ash; and these impurities are removed by volatilisation of the iodine in iron, cement-lined retorts, subjected to a gentle heat for several days. The sublimed iodine, of 99 per cent. purity, is condensed in stoneware pipes, 2 ft. wide, joined by uncompact luting to allow water to drain out; it is then collected, packed in small barrels, sealed, and branded. A fortune, it is stated, awaits the chemist who, by discovering a great commercial outlet for iodine, makes possible the utilisation of the enormous supply of iodine here represented.

The storage and export of nitrate and iodine absorb the entire activities of the "nitrate ports" of North Chile, such as Antafagasta, and the duty of 2s. 4d. per 101.8 lb. (pre-war rate), imposed by the Excise on the exported nitrate, provides 80 per cent. of the Chilean revenue—a fact which has tended to diminish notably the virility of the Chilean character.

Theories of Formation of Deposits

No fewer than ten plausible theories are now variously held, and, pending an investigation by geological and chemical authorities, no definite conclusion on the question can be reached. The first theory mentioned assumes an algal origin in a slowly dried-up inland sea, though it fails to explain the absence of bromide. The second theory suggests that the beds were originally guano deposits, but in that case phosphates would be expected. The third postulates the formation of oxides of nitrogen by tremendous silent brush discharges which are assumed to occur when wet sea-fogs drift over the dry plains during winter. The fourth involves the influence of ultra-violet light in initiating the combination of oxygen and nitrogen at high altitudes, an action which should theoretically have been accompanied by the similar formation of stable hypoiodate. The fifth and most probable theory is that this area, having in a past geological age been the centre of intense thunderstorm conditions, oxides of nitrogen were produced in the atmosphere, and, entering underground drainage systems as nitrates, were ultimately deposited in the same manner as "vernis du désert" when the water was drawn by capillary action to the surface.

Questioned later, the lecturer gave the estimate that the beds would last a further 100 years, and, with the introduction of economical factory processes and the abolition of the crushing export duty, the Chile nitrate factories might be able to compete successfully with the synthetic processes.

Chemical Exhibits at Glasgow

(FROM OUR OWN CORRESPONDENT.)

IN going through the Chemical Section of the British Science and Key Industries Exhibition at Glasgow the fact that strikes a visitor more than anything else is that the chemical section is somewhat overshadowed by the more obvious attractions of the engineering and allied sections. At several previous similar exhibitions many of the chemical firms contented themselves with stands showing sets of samples of their products. In some few cases—as, for example, that of the Gas Light and Coke Co., of London—some of the uses to which those products are put are indicated by specimens of paper stained with Prussian blue, enamelled leather, pencils, laundry blue, &c., as well as fabric dyed with beta naphthol base, which are shown. The showcases exhibited by this company and by others—for example, the South Metropolitan Gas Co., Brunner, Mond & Co., the United Alkali Co., W. J. Bush & Co., and R. Graesser, Ltd.—are well got up and arranged, and are of great interest to the chemical visitor, but they cannot appeal very forcibly to the ordinary person. Messrs. Johnson, Matthey & Co. have an interesting case showing the rarer metals and metalloids, and the British Drug Houses, Ltd.'s, series of recent indicators, together with tubes showing their colours in acid, alkaline, and neutral solutions, are worthy of attention; some indication of their limits of sensitiveness and application would have been helpful. The British Dyestuffs Corporation, Ltd., have made good use of the prominent position they occupy, and show an interesting range of dyestuffs, together with specimens of their application; the section showing synthetic indigo is especially worthy of attention. At the next stall Messrs. Brotherton & Co., Ltd., have a similar if somewhat less extensive display. The Damard Lacquer Co., Ltd., show a fine range of samples of the uses to which their product "Formite," a condensation product of formaldehyde and phenol, may be applied. Thermit, Ltd., show a range of specimens of their products formerly imported from Germany.

Chemical apparatus and glass ware are shown by Messrs. Baird & Tatlock, who also exhibit one of their new British-made "Microid" balances and samples of "Analoid" and "British Chemical Standard" preparations for rapid analysis. The British Chemical Ware Manufacturers Association have a fine display of chemical and other scientific glass of wide range and excellent appearance, which brings forward very vividly the advances made in this particular branch since foreign supplies have been cut off.

The Glass Technology Department of the University of Sheffield have an interesting display of calibrating and other machines and of special glass ware. Chemical engineering is not very extensively represented, and this seems a pity. Coke-oven construction is represented by the Koppers Co. and Messrs. Simon Carves. The Lennox Foundry Co., Ltd., has a full range of their specialities, including autoclaves, vacuum and drying ovens, and other plant made of Tantiron. The small-scale hydraulic classifier, which is shown at work separating dirt from coal by the Rhondda Engineering and Mining Co., Ltd., is of interest, as it dispenses with all mechanical parts.

The Black Sand Deposits of Oregon & California

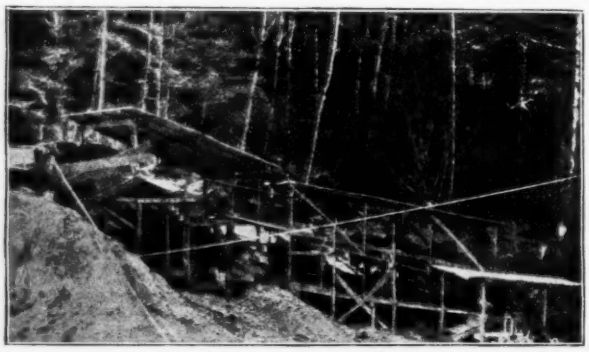
By R. R. Hornor*

As a result of the unusual demand for platinum in the manufacture of materials needed in war, and of the decrease in supply through smaller imports resulting from the curtailed production in Russia, the United States has been confronted with a serious shortage of this metal, and the market price has risen to four or five times the price in 1914.

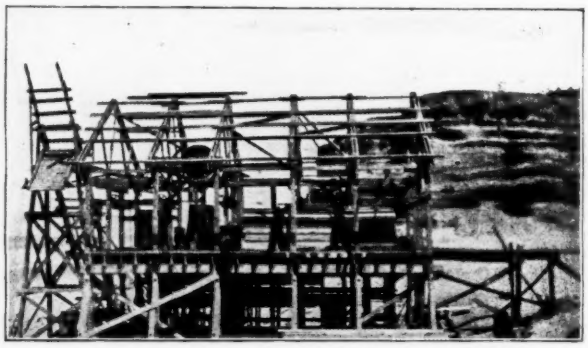
On account of this unusual situation and the need of ascertaining the possible increase of production in this country, the Bureau of Mines decided to investigate some of the more promising localities on the Pacific coast where gold and platinum are known to be associated with such minerals as magnetite, chromite, and ilmenite, with various siliceous minerals, the aggregate constituting what are commonly known as "black sands." The object was to determine whether any of these deposits are large enough and contain sufficient gold and platinum to be profitably exploited, and also to determine whether the base minerals present especially the iron minerals, might be commercially utilised as a source of iron.

History of Beach Mining

For more than 60 years the black sands of the Pacific coast have been exploited for their gold content, and at an early date platinum and its associated metals, osinium, iridium, and palladium, were known to exist in some of the placers of northern California and southern Oregon, but in the early days the platinum was given little attention by the placer miners on account of its small value and the limited market. Indeed, it was considered objectionable, and was usually discarded as worthless when the gold clean-up was made. Within recent years, however, many of the old clean-up dumps have been worked for their platinum content, some of them with gratifying results.



Black-Sand Plant, Eagle Mine, Bandon, Oreg.



Side View of Black-Sand Plant under Construction on Beach

The ancient beaches did not prove as rich as the present beaches, and most of them were rather difficult to work because the gold-bearing beds in many places were deeply buried under sand and clay; besides, the surface was covered with a heavy growth of timber and vegetation and with fallen trees, so that mining was both difficult and expensive. The period of greatest activity appears to have been from the beginning to the middle seventies, when the richest and most accessible of the old beaches were being worked. From that time until the present many futile attempts have been made to work both the present and the old beaches for the gold and platinum that they are supposed to contain. A few individuals, it is true, make a precarious living by working places along the coast where at certain times of the year the tide and storms effect a rough concentration of the sands; but wherever an attempt has been made to work the sands on a large scale, failure has invariably been the result.

Black-sand mining in the past has offered a fruitful field for unscrupulous promoters and has been especially alluring to men having little knowledge of mining or mining methods. These swindlers usually claim to have some wonderful machine or process for extracting gold and platinum from the sands. Many of these agents made the most extravagant claims for the processes or machines. Some of these process men were so bold as to claim that they could recover gold and platinum where it could not be detected by any known scientific method. As a result the Pacific coast is strewn with the wrecks of many kinds of experimental machines and of plants that bear evidence to the credulity and childlike simplicity of those who had been induced to invest their money in schemes for treating the sands.

Character of Deposits

Most geologists who have made a study of the rocks of the Pacific coast concede that the black sands with their gold and platinum content have been derived from the disintegration of basic igneous rocks of the ferromagnesian type.

The black sands represent the hard and more resistant minerals left from the erosion of ferromagnesian rocks, and consist of particles of quartz, olivine, garnet, zircon, and other silicates, with magnetite, chromite, ilmenite and hematite, and frequently a little gold and platinum. These particles are found in small quantities in nearly all water-borne sands and gravels. The origin of the gold-bearing black sands on both the present and ancient beaches is chiefly the result of natural concentration of slightly auriferous sands and gravels that have been transported to the ocean by streams, and perhaps to a less extent to the erosive action of the waves on the rocks forming the coast line that may contain in places a slight amount of gold and platinum.

In some of the ancient beaches examined, some of the beds are rather homogeneous and in many places cemented into a compact mass by the decomposition of the iron minerals present. These beds are 150 to 200 feet wide and sometimes reach a maximum thickness of 10 ft., averaging 3 to 4 ft. thick as a rule. In section they are thickest at the centre and gradually thin down on either side. The heaviest and largest particles were concentrated on the landward side, where the wave action was the greatest, and here also the gold and platinum content is highest.

Utilisation of Black Sands

As has already been pointed out, black sand deposits of the Pacific coast have been worked for their gold content with indifferent success for many years, and in more recent years for their platinum content at a few localities in southern Oregon and nothern California. The impression has gone forth that many of these deposits are of large extent and are fairly rich in gold and platinum that cannot be successfully recovered by any of the known methods, because these metals are supposed to exist in some peculiar form.

The gold and the platinum are usually in fine thin scales that are somewhat difficult to save in the sluice box or other gold-

*Extracted from Technical Paper No. 196, issued by U.S. Bureau of Mines.

saving machine, and much of the gold in the old beach deposits is tarnished and difficult to amalgamate. However, the chief trouble lies in the meagre content of gold or platinum. Occasional small isolated areas have a good content through local concentration, but in most places the material contains only a few cents' worth of gold and platinum per ton. Another erroneous idea is that the gold in the black sands, and especially in the old beach deposits, is difficult to treat metallurgically.

The gold in the black sands is known to be entirely amenable to cyanide and to chlorine, with comparatively small consumption of these reagents, and if the sands are found in quantity and quality that warrant erecting a plant using either cyanidation or chlorination, there would be no difficulty in recovering the gold. An important consideration in estimating the value and extent of any alluvial deposit is careful and systematic prospecting, either by sinking pits, at regular intervals, or by drilling with some approved type of churn drill. No attempt whatever has been made to prospect systematically the majority of the black sand deposits examined. Such prospecting as had been done was confined to exposing a few outcrops or sinking an occasional shaft on an old beach, and panning random samples from the surface of the present beaches. On one ancient beach examined, haphazard drilling had been done some years ago, but few beaches have been drilled with the care and precision generally shown in prospecting dredging ground.

Lang points out an example where a deposit of 200 acres, on the Oregon coast, was carefully drilled, and gave disappointing results, as, instead of a content of $4 per yard in gold as was claimed, the highest assay was only 60 cents per yard, and many pannings showed no trace of gold. Assay results obtained from a number of samples taken by the writer confirm Lang's observations, as many of the assays show no value whatever.

Black Sands as Source of Iron

From time to time it has been proposed to utilise the magnetite in the black sands as a source of iron ore for the manufacture of iron and steel, and also to recover, so far as practicable, other useful minerals present, such as chromite, ilmenite, monazite, and zircon. The first serious attempt of this kind was in 1893, when a San Francisco company was organised to exploit various deposits in California to recover the gold and platinum and then employ the magnetite in the production of iron and steel. This attempt resulted in failure. Public attention was not again directed to the subject until 1905, when the investigation by the United States Geological Survey was begun. During the experiments at the Lewis and Clark Exposition a large number of tests were made in smelting the magnetic iron minerals in the electric furnace, and the results were very satisfactory. However, no attempt was made to determine the actual extent of the deposits, nor whether the sands could be profitably worked as a source of iron.

The various steps that are involved and on which the success of the operation depends are :

1. Thorough prospecting to insure that sufficient material is available.
2. Mining or collecting the material.
3. Concentration of the material to get rid of waste and separation of concentrate into its various constituents.
4. Treatment of the valuable ingredients.

Obviously the success of the operation depends upon the cost of collecting the material, yet in most instances little or no attention is given to this important problem. Those who undertake to exploit the deposits generally assume that the material can be cheaply mined and give no further consideration to the matter. As a matter of fact, the mining cost is usually the biggest item and is one of the chief factors contributing to the large number of failures. It may be said, therefore, that the chief obstacles to the profitable exploitation of these deposits are lack of uniformity, both as to metallic content and occurrence, and the high cost of mining and treatment.

Electric Smelting Experiment

The writer, in co-operation with Mr. J. D. Mereen, who constructed a small experimental furnace, undertook to smelt some consolidated black sand without any preliminary treatment except crushing. About 50 lbs. of the material was crushed to 10 to 20 mesh and mixed with 10 to 15 lbs. of pulverised coke. This charge was introduced into the furnace without previously heating the furnace. A direct current of 600 amperes at 110 volts was turned on, but as soon as the charge began to get hot there was great difficulty in regulating the current, which could not be increased above 800 amperes with safety. Consequently, to regulate it the electrode had to be frequently raised, with the result that the arc was soon on top of the charge and no smelting action could be obtained. After running the furnace for about two and a-half hours without positive results, the experiment was discontinued.

Later Mr. Mereen repeated the experiment with some variation in the charge and reports that from 60 lbs. of the black sand he obtained 15 lbs. of a ferro-alloy. A sample of this alloy was submitted to examination and an approximate analysis was made, which gave the following results :—

Results of analysis of ferro-alloy from black sand.

	Per cent.
Iron (Fe)	30 to 35
Titanium (Ti)	12 to 15
Chromium (Cr)	7 to 8
Silicon (Si)	30 to 40

F. C. Ryan, electrometallurgist connected with the Seattle station, pronounced the alloy to be a ferrosilicon, containing titanium and chromium that in its present form would not, it is thought, have any commercial value.

The results of the investigation may be summarised by the statement that in general the black-sand deposits are disappointing in both value and quantity ; they rarely contain enough gold and platinum or occur in adequate quantity to be exploited at a profit.

There are, it is true, a few favoured places where small areas of the black sand show some precious-metal content, and these may become the site of small operations. The deposits in many places contain appreciable amounts of magnetite, chromite, and ilmenite, but these minerals are generally too scattered and too poor to constitute an important source of iron ore, especially in competition with the known deposits of magnetite on the Pacific coast.

The chief difficulties in the profitable exploitation of these deposits are : First, lack of uniformity in occurrence and metallic content ; and, second, the high cost of mining and treating the materials.

Waste in the Coke Oven Industry

An Address by Mr. J. W. Porteous

On Saturday, November 22, at Durham, Mr. J. W. Porteous, the new President of the Northern Section of the Coke Oven Managers' Association, delivered his presidential address to a general meeting of the Section.

Mr. Porteous said that they had heard a great deal recently about the necessity of fuel economy, but scarcely a word about the saving that might be effected in the coke-oven industry. Great steps in progress had been made respecting the condensation of gases and the recovery of by-products, but they still appeared to go on in a crude and unscientific way regarding the fuel put into the ovens. Little attention was paid to the grading of the fuel, or the crushing, washing, and draining of it, and it was due to that fact that a great deal of waste was taking place.

Trouble Caused by Over-Percentage of Moisture

Moisture was responsible for wasting hundreds of tons of good coking material in Durham county alone every week. A large amount of gas was required to deal with moisture which, more often than not, ought not to be there. Another point in connection with water trouble in plants where condensing facilities were limited was that as the water began to run to the seal pot it naturally took up a certain amount of ammonia. On plants where coal with a large percentage of moisture was used there were more naphthalene troubles than where dry coal was used. Moisture up to 9 per cent. undoubtedly improved the yield of ammonia ; it helped to protect it in the oven, but above 9 per cent. the yield of ammonia had a tendency to fall. Too large a percentage of water also affected the coke yield. There were cases where 2 per cent. of coke had been lost through the stamping of the fuel. Owing to the repressed character of the cells and the steam being converted, the oxygen came into contact with the carbon, formed water gas, and the yield was decreased.

A great enemy of the coke-oven manager was the question of ash. The carbon available was seriously decreased by the presence of ash, and it was essentially a subject for investigation. Ash was injurious to the yield of ammonia, not only because of the position it occupied in the oven instead of clean coal, but also from the fact that when the ash contained a certain amount of iron in an oxidised state, or even as pyrites, the iron acted upon the already formed ammonia, and, by catalytic action at certain temperatures, say, 600 and upwards, destroyed a large amount of ammonia already formed when it came into contact with it. He suggested that, when the yield of ammonia fell in a manner unaccounted for after the usual examinations of the plant had been made, a further investigation in respect to the iron content of the ash would result in solving the problem to a large extent.

Early Types of British Respirators

By T. Johnston

In an interesting article the writer discusses the evolution of the earlier gas masks. He gives particulars of the impregnating solutions employed, and shows by reactions the manner in which these performed their work.

In the early days of gas warfare, when pure chlorine was the only gas used for offensive purposes, the preliminary types of gas masks were quite efficient, and proved to be satisfactory enough. The concentration of gas was so low that a very simple mixture of chemicals was found to be successful in counteracting the effects of the gas in the field.

With the introduction of phosgene, and the possible appearance of metallic poisons, lachrymators and vesicants, however, the early types had soon to be discarded. With the rapid development of chemical warfare there was a simultaneous development of protective appliances and principles, culminating in the introduction of the box-respirator, and the elaborate scheme of anti-gas training until recently in operation. Even the box-respirator—a striking example of ingenuity and convenience—has been modified from time to time, but never has it proved anything but a thoroughly satisfactory protection against all poisons and lung irritants that have been employed by either group of belligerents.

The first respirator ever supplied to the British troops was very crude—a rough pad of cotton waste, covered with black gauze, and impregnated with a solution of "hypo." When used it was just tied over the mouth and nostrils, preventing speech and causing vomiting. All that can be said for it is that it absorbed chlorine, and sufficed until a better and more comfortable pattern of respirator could be provided.

The Helmet Respirator

The "Helmet" respirator was the next device. It was merely a flannel bag fitted with a strip of mica for visionary purposes, and treated with a solution of sodium carbonate and "hypo." It was worn over the head and neck, and was tucked in under the collar of the tunic. Although much more comfortable than the first type, it became extremely hot after a short time, and owing to the formation of small quantities of sodium hypochlorite, the troops had the idea that the helmet was allowing the gas to come through. The following are the reactions that take place :—

1. $Na_2CO_3+H_2O = 2NaOH+CO_2$
2. $2NaOH+Cl_2 = NaCl+NaOCl+H_2O$
3. $2Na_2S_2O_3+Cl_2 = Na_2S_4O_6+2NaCl$

Sodium Tetrathionate

As far as chlorine is concerned the helmet was quite a good mask, and was quite satisfactory in practice, but the employment of other gases had to be kept in view. For example, the forward reaction with prussic acid probably would not proceed sufficiently to ensure adequate protection :

$$Na_2CO_3+2HCN=2NaCN+CO_2+H_2O$$

The need for improvement was evident, and the dipping solution was replaced by a mixture of caustic soda, phenol, and glycerine in water. In this mixture a free alkali would always be available to neutralise any acid that is formed in the reaction between phenol and chlorine.

$$C_6H_5OH+3Cl_2=C_6H_2Cl_3OH+3HCl$$

The introduction of phenol considerably reduced the action of the caustic on the skin, by the formation of sodium phenate.

$$C_6H_5+NaOH=C_6H_5ONa+H_2O$$

This reaction, however, in no way interferes with the chemical function of the soda, for the presence of the acid hastens the back reaction. The glycerine acts somewhat similarly, and being somewhat hygroscopic, tends to keep the helmet moist, and thus assists the reactions. Obviously, the excess of free alkali is important, and an excess of 5 per cent. over the amount of soda required by the phenol, if the forward reaction were completed, is used.

The action of phosgene is very similar, forming phenylcarbonate and hydrochloric acid, which is neutralised by the soda.

1. $4NaOH+COCl_2 = Na_2CO_3+2NaCl+2H_2O$
2. $C_6H_5OH+COCl_2 = (C_6H_5)CO_3+2HCl$

It was found that the foregoing reactions did not proceed fast enough when stronger concentrations of gas commenced to be employed, and hexamine was introduced into the fabric of the helmet. This afforded a means of practically adding ammonia to the mixture. The presence of additional mixture from the exhalations from the lungs favours the back reaction :—

$$4MH_3+6C.HO=C_6H_{12}N_{14}+6H_2O$$

The presence of the formaldehyde produced constituted a difficulty, for it slightly affected the lungs and eyes of the wearer. In the case of hexamine, the decomposition of phosgene is more direct, resulting in the formation of ammonium chloride and urea :—

$$COCl_2+4NH_3=CO(NH_2)_2+2NH_4Cl$$

With the development of the latest respirator of the "Helmet" type, several mechanical improvements were devised. The original mica strip was replaced first by circular eye-pieces of glass, then by mica eye-pieces. An expiratory "flapper valve" was also provided, enabling one to see much more clearly, and to breathe with greater ease, and less discomfort from the heat. Certain of the German "lachrymators," *e.g.*, monobromacetone, $CH_2Br.CO\,CH_3$, were found to pass through the impregnated material previous to the first issues of box-respirators, and helmets fitted with goggles for the protection of the eyes, were supplied.

Filter Tower Principle

Cloud gas and large-scale gas bombardments came to be employed so frequently, and such high concentration of gas was aimed at, that the "flannel bag" respirator, although made eventually of double thickness material, had to be abandoned in favour of the face-piece and "filter tower" principle of the box-respirator. Nevertheless, the old smoke helmets served their purpose while they were required, although they have now been superseded by a more comfortable, efficient, and certainly more elegant production.

Arbitration Awards

The following awards have been made under the Wages (Temporary Regulation) Act, 1918 :—

Paint, Colour and Varnish Trade.—The National Association of Associated Paint, Colour and Varnish Manufacturers of Great Britain *v.* the National Federation of General Workers. Award—From August 8, 1919, the men concerned, aged 18 years and over, to receive an advance of 4s. a week.

Glass Bottle Makers.—The City Glass Bottle Co. (Ltd.), Canning Town *v.* the Glass Bottle Union of Yorkshire United Trade Protection Society. Decision—Claim for the extra advance of 5s. a week to London workers to be retrospective from May, 1918, not established.

Drug and Fine Chemical Industry.—The Drug and Fine Chemical Manufacturers' Association *v.* the Amalgamated Society of Pharmacists, Drug and Chemical Workers. Award—From first pay in August adult male workers in receipt of rates not exceeding 15s. above the fixed minimum rate of the class to which they may belong to receive an advance of 5s. a week; those receiving in excess of 15s. to receive such amount as to give them not more than 20s. above the existing minimum of their grades. The weekly minimum rates for timeworkers to be the guaranteed rates for pieceworkers according to age and grade. Other items of claim not established.

Seed Crushing and Vegetable Oil Production

Paper by Mr. B. P. Flockton, M.I.M.E.

At the Manchester College of Technology, on Tuesday, November 18, Mr. B. P. Flockton, M.I.M.E., read a paper on "Seed Crushing and Vegetable Oil Production."

There was no industry, he said, in the British Isles which had developed more rapidly of late years than the industry under consideration. In this country, in 1885, there were practically only two seeds being crushed, *i.e.*, linseed and cotton seed, the oil obtained being used for paint, varnish, and soap making exclusively. At present almost every known variety of oil seed was being treated, and the oil adapted for edible and commercial use by refining and deodorising. There were upwards of 200 known varieties of oil-yielding seeds, and others were being discovered from day to day, yielding oil in varying quantities, from 50 per cent. in maize to 66 per cent. in palm fruit pericarp. It was, therefore, obvious that from a commercial point of view varying methods of treatment must be employed.

Broadly speaking, there were two methods of obtaining oils. The first was by means of hydraulic pressure, and the second by the use of solvents. It was with the first method he proposed to deal. For the purpose of the expression of oil by hydraulic pressure two systems were necessary, owing to the great difference in oil content of the various seeds.

Anglo-American System

The first system was generally known as the Anglo-American system, and was suitable for the treatment of seeds containing not greater than 30 to 35 per cent. of oil, while the second, the cage press system, was used in the case of the oil content exceeding that figure. By the Anglo-American system the pressing of the seed was done in hydraulic presses constructed with open plates, while in the cage press system the seed was contained, during the application of pressure, in a cage or box. The seeds were first cleaned and separated from dust and metallic substances by means of screens and magnetic separators, after which they were suitably broken and ground in order to obtain a fine flake. The meal in this condition was heated or cooked, and moistened by steam at a low temperature, after which it was subjected to hydraulic pressure in order to express the oil.

Mr. Flockton described in detail the construction and operation of the machines employed for the treatment of oil seeds by the Anglo-American system. In the arrangement of the plant it was essential that the various machines should be so placed as to allow of the operations to be carried on by mechanical means as far as possible, thus ensuring economical handling, and at the same time avoiding stoppages and consequent losses. Another point to be taken into account was to reduce, as far as possible, the length of time the meal was in transit from the heating kettle to the press, in order to avoid loss of heat, and thereby ensure the cake or residue being of a uniform value as regards oil content. An illustration of an eight-press Anglo-American oil mill was then exhibited, its working capacity being about 200 tons of seeds treated in a working week of 132 hours.

In every oil mill it was necessary to work day and night in order to maintain the factory and the machinery at a uniform temperature, and to allow this to be done it was usual to work three shifts of eight hours each. After cleaning, the seed was passed through chilled cast-iron rolls for the purpose of being reduced to a flake, and delivered into an elevator or conveyor, and ultimately to the heating kettle. The next operation consisted in moulding or forming the cake to the desired shape for placing in the press, this being done by a moulding machine, the meal being loosely pressed and wrapped in a woollen wrapper and conveyed by hand to the hydraulic press, where it was placed between steel press plates suspended from the press head. Upon the completion of the operation of loading the press, hydraulic pressure was admitted to the cylinder, and the cakes subjected to a gradually increasing pressure up to about one ton per square inch on the cake, which expressed the oil and left the residue, or cake, with an oil content varying from 5 to 8 per cent., according to the class of seed being pressed. The edges of the cakes contained a considerably higher percentage of oil than the other parts, due to the looser packing of the meal and the impossibility of subjecting a cake of such shape in a loose wrapper to an even pressure, and for this reason the edges of every cake were removed by paring in a machine designed for the purpose. The parings were afterwards re-ground and returned to the heating kettle, where they were mixed with new meal and again pressed. Certain varieties of cotton seed were covered with an appreciable amount of lint, and this necessitated the provision of additional machinery for the purpose of grinding the lint until it became an integral part of the meal. A diagram of an oil mill equipped with large edge runner stones suitable for the purpose was shown.

Removal of Dust

A point particularly emphasised by Mr. Flockton was with respect to dust. The removal of the dust reduces the quantity of seed to be handled by 5 to 10 per cent., but if this dust was left in the seed it absorbed oil and reduced the total oil yield by the amount of oil thus absorbed. It also had a serious effect upon the efficiency of the machines, rolls being worn and requiring more re-grinding, elevators and conveyors being impeded in their work, besides many other activities being set up which were too numerous to mention. Dust could easily be removed by means of rotary screens covered with wire or gauze mesh of a fineness to prevent the passage of the seed whilst allowing the dust to escape. The screen was covered with a woven wire mesh at the delivery end, which allowed the seed to pass through, while stones, straw, and other foreign matter were carried forward, collected, and destroyed. Photographs of magnetic separators for iron and steel were then shown, and their operation explained in detail.

Rolling Processes

As it was absolutely necessary that all the minute oil cells in the seeds should be bruised, it was inadvisable to use one set of rolls for every known variety of seed, and it was worth consideration whether it would not pay a seed crusher to change his rolls for every variation in seed, or at least to change the upper rolls, which would be grooved especially to suit the requirements. The rolls were of chilled cast-iron, ground dead true to size, and were generally supported in the frame so as slightly to stagger them, thus giving a better grinding than if they were fixed exactly one over the other. Some seeds were better rolled if the rolls were of slightly varying size. In the standard size exhibited they were 16 inches diameter by 48 inches long. The upper or second roll was usually grooved to ensure the flow of the seed, but the lower rolls were smooth. It was essential that the feed should be perfectly regular in order to obtain a satisfactory meal, otherwise whole seeds would be passed through the rolls untouched.

Seeds varied considerably in size, and were frequently mixed with impurities which were impossible to eradicate. Linseed, for instance, was invariably mixed with rape, and consequently when the feed was stopped the smaller seeds continued to flow by gravity and caused serious trouble by choking the rolls. Mr. Flockton stated that he had recently taken out a patent, in conjunction with a seed crusher of very considerable experience, for an automatic feed hopper which overcame those difficulties. In order to reduce driving power, which was considerable, most seed rolls were now constructed with roller bearings to the bottom roll, this resulting in a saving of approximately 30 per cent. of the power previously required.

Milling Operations

The operating of milling by means of edge runner stones was then explained, and also the adoption of a double heating kettle, consisting of two kettles of equal capacity, superimposed, the upper one receiving the meal and the lower one discharging it, in order to secure perfect heating and cooking of the meal. Both kettles were fitted with agitating gear, but it was usual for the lower one alone to be fitted with moistening apparatus. It was an additional advantage if the upper one was fitted with an automatic discharge outlet, this being so constructed as to maintain the meal in the lower kettle at a fixed level and ensure the even distribution of moisture. It had also been found in practice that better results were obtained if the inherent moisture contained in the meal was drawn off before surface moisture was added, and with a double kettle this result was obtained.

The Cage Press System

Mr. Flockton then described the moulding machine and the method of pressing the cakes. The "Cage Press" system was the natural outcome of the difficulties experienced in pressing seeds and nuts containing a high percentage of oil, and it was not until 1886 that a press was specially designed to overcome these difficulties. It was found that when meals containing from 40 to 50 per cent. of oil were pressed in the Anglo-American process the escaping oil burst the wrappers, and in addition carried away an excessive amount of meal. It was therefore decided that it would be advantageous to instal a press for the preliminary pressing of the meal, and the first mill of this kind was erected at Dover for the purpose of crushing and pressing copra. The meal was first pressed to remove about one-half of the oil, and afterwards subjected to a second pressing in Anglo-American presses further to increase the oil yield, and this method was so successful that it was adopted not only in England, but in many other parts of the world. The press was constructed with a box or cage built in sections, consisting of circular sheet steel plates strengthened by angle iron and perforated with a large number of small holes. The presses were frequently modified and improved, and eventually the Anglo-American press was eliminated for second pressing, and Cage Presses substituted to work at a considerably increased pressure. The continued rise in costs necessitated further developments, the object being to press in a single operation.

Mr. Flockton exhibited photographs of the fixed type of cage press installation and also the travelling cage type. He explained that before the seed could be rolled it must be broken, by means of special rolls, into pieces of such size as to allow of even and regular feeding and treatment by the final reduction rolls, and for this preliminary treatment the type of rolls employed had to be varied in accordance with the size and nature of the seed under treatment. Illustrations were shown of the types of reduction rolls usually employed. The heating or cooking kettle in the cage press was always of the double type, it being essential that the meal should be of a high temperature while the added moisture must be evenly diffused. As a result of the process the cake was generally found to contain from 5 to 6½ per cent. of oil, varying in accordance

with the class of seed or nut being pressed. Each load of meal weighed approximately 5 cwts., divided into 45-50 cakes, and in order to ensure that each cake should be subjected to equal pressure, it was essential that all side friction should be eliminated during the pressing operation. This was done by allowing the cage to rise or float during the time the cakes were under pressure, and it was raised by the side friction on to the top ram or loose head, thus equalising the pressure throughout the entire mass of cakes.

The pressing cage containing the meal during the foregoing operation was built up of steel bars of a special section accurately machined and placed edge to edge with minute spaces, generally from 4 to 8-thousandths of an inch between each. These spaces allowed the oil to exude freely but prevented the escape of the meal. The bars were securely fixed both top and bottom in steel castings with machined grooves, and were supported by weldless steel rings, the whole being bolted together. The top casting was occasionally fitted with a plate-holding device to ensure each cake being of uniform thickness, but after a very short time the operator became sufficiently expert to abandon the use of this.

Travelling Cage Type

With respect to the travelling cage type of press the cages were loaded in a preliminary press and transported for final pressure to a final press by means of a travelling carriage. After pressing, the cages were returned to the preliminary press to be unloaded and again filled with meal. The preliminary compressing and extracting press was constructed with an upper compressing cylinder and ram as in connection with the fixed type of cage press, and in addition there was an extension piece under the pressing cage of the same shape as the cage itself. This allowed of the cages being considerably shorter than would otherwise be the case, the cakes in the extension piece being forced into the pressing cage from below after the case had been as fully charged as possible by use of the upper compressing rams.

The presses were usually arranged in batteries of four or five and the pressing cages were square and not circular as in the fixed type. This shape of cake rendered it an impossibility to construct the cages upon the bar principle, and consequently they had to be built up of plates perforated with holes about 1¼ mm. diameter on the inner side of the plate tapering out to 4 mm. on the outside. This was a serious drawback as regards the escape of meal. In the fixed cage constructed with vertical bars the escape of meal was infinitesimal, and, owing to the bars being arranged in the formation necessary to obtain a circular cage, the small amount thus escaping could readily pass away without causing obstruction, but in the square type of cage the perforations, although very small, were sufficiently large to allow a very considerable escape of meal, which accumulated behind the plates forming the cage, and had to be periodically removed. For this reason it was usual to supply an extra cage with each battery of presses in order to ensure continuity of pressing and allowing for one cage being out of commission while being cleaned. This system of pressing was a Continental one, and was not nearly so efficient or free from breakdown as the fixed type.

It could readily be understood that should the preliminary press or the travelling carriage break down at any stage of the operation the whole battery must of necessity become inoperative. Small self-contained mills on the cage press system had been constructed of a type suitable for the use of plantation owners and others who might have small quantities of oil-bearing seeds and nuts available, the capacity being approximately 20 cwt. of seed per day of eleven hours.

In conclusion, Mr. Flockton stated that vegetable oils, when obtained by the various processes described, required considerable further treatment before they could be used for any commercial purpose, but that the whole subject of refining for soap-making, or further refining and deodorising for edible purposes, would necessitate the preparation of a treatise reserved solely for that purpose.

Utilisation of Waste Products

Dr. A. C. Cumming, in a lecture at Edinburgh University last week, said that as a rule in manufacturing one substance others were obtained for which at first no use could be found, and instanced the huge mounds of chalk sludge in the neighbourhood of paper works as showing how a waste product accumulated if no use were found for it. In the early stages of the illuminating gas industry most of the by-products were causes of expense and nuisance, yet by 1884 one of the London gas companies were receiving for their tar and ammoniacal liquor 80 per cent. of the total amount they were paying for coal. A moderate estimate of the present value of gas liquor, which was a source of expense less than fifty years ago, was now at least £30,000,000 per annum. Among other instances of the present value of what was once a useless by-product, the case of hydrochloric acid liberated in the Leblanc soda process was mentioned. This at first caused such a nuisance that, through municipal intervention, works were closed, and factories shifted from town to town in order to continue the manufacture. It was only collected at last under legislative compulsion; yet to-day the Leblanc soda process competes with rival processes only on account of the revenue derived from this once-despised by-product. Fusil oil from the distilleries, brewers' yeast, fat from wool-scouring and from laundries, acetone from wood waste, and alcohol from the waste products of paper works were profitable industries which showed what can be done with waste materials.

Chemistry in Modern Warfare

Lecture by Dr. E. A. Werner

The opening meeting of the Dublin University Experimental Science Association was held last week in the Physics Theatre, Trinity College, when a lecture on "Chemistry During the War and After" was given by Dr. E. A. Werner, President of the Association, before a large audience.

Dr. Sidney Young, F.R.S., who presided, said that Dr. Werner during the war applied himself with great energy to chemical and laboratory work, and as a result he had been able to supply the Ministry of Munitions with considerably increased quantities of many valuable products.

High Explosives

As an example of the value of practical chemistry Dr. Werner mentioned first nitric acid, because it was easily the most important chemical used in connection with the war. It would be impossible to describe all the high explosives which had been employed in the war, but two, viz., picric acid and the famous T.N.T., were amongst the most important, and were derived from nitric acid. That chemical was obtained from Chilian nitrate, of which Germany imported something like 750,000 tons a year before the war, while England was satisfied with something like 140,000 tons a year. Picric acid had been known to chemists since 1771, but it took over 100 years before its value as a high explosive was discovered, Picric acid had been for years used as a dye by the Germans, and also as an adulterant for beer before its great explosive power became known. It was discovered first by a German, but not one whose motto was *Deutschland über Alles*. He did not, strange to say, go with his discovery to his own Government, but to the most unlikely of all Governments, viz., the French, who were quick to appreciate its great utility, and who were the first to use high explosives in war.

Before the war there were not more than two manufactories in England turning out nitric acid, while Germany was at once able to turn her vast chemical factories to the manufacture of explosives. But it was to the credit of English chemists and engineers that in 1917 there were 101 factories making nitric acid, and the weekly output in each amounted to about 1,000 tons. But even that enormous output was less than half their requirements in 1917, for there were required also something like 227,000 tons of high explosives for shell-filling. The deficiency, however, was met by the simple discovery that by mixing T.N.T. with about four times its weight of nitrate of ammonia an explosive was obtained that was 5 per cent. more powerful than T.N.T. alone.

Before the war they were dependent upon Germany for practically all their supplies of phenol and toluene; but in respect of the former the French chemists came to their aid. Before the war the French had been paying something like 30 francs per kilo. to America for phenol, and in the early years of the war the Americans discovered that phenol could be manufactured from benzine. As regarded the supply of toluene, Borneo supplied about 80 per cent. of the amount required for the preparation T.N.T., but England had also to thank the chief chemist of the Birmingham Gas Works, who, as events showed, proved to be the best chemist at the head of any gas works in England during the war, and was able to produce large quantities of benzine and toluene. Thanks to the British Navy, they were never short of nitric acid. But neither was Germany short.

Helium and Mustard Gas

Dr. Werner proceeded to deal with the value of certain drugs, notably novokaine and otovaini, and the work done by Liverpool University in their manufacture for munition use. Before the war there was very little hydrogen manufactured; so little, indeed, that it cost about 32s. per 1,000 cubic feet, but it was now being produced at a cost of 4s. per 1,000 cubic feet. Helium was the gas which the Germans used for the inflation of the Zeppelins, but though it was a gas which existed only in minute proportions, he had been not a little amused recently on reading that in America they have a factory that is producing millions of cubic feet of helium. Helium was the only gas that could have been used to take the place of hydrogen, and the manufacture of it on a large scale was one outcome of many of the problems that had to be faced after the war. Though Germany was cut off from the world owing to the blockade, England was cut off from a far larger number of the necessaries for carrying on the war on account of her neglect of the application of experimental science. Potash, from the supply of which they were cut off, was a commodity of which Germany had been the world-provider, but England in future would not be dependent on Germany.

Speaking of mustard gas, which the Germans first used in the attack on the Ypres salient in July, 1917, Dr. Werner said that four days after that gas was used English chemists were able to state accurately its nature and composition. The gas was really the discovery of an English chemist, Dr. Guthrie, who had discovered it in 1859, and minutely described its poisonous effects in a paper read in the following year; and in 1886 it was re-discovered by a German chemist named Dr. Victor Meyer. Notwithstanding all the advantages which Germany had had from her early preparations, in England they were able to produce daily a supply of mustard gas which was more than equal to the monthly production of Germany, and at a cost of less than one-third of hers.

The German Dye Industry

Concluding, Dr. Werner asked how they were to regain the position that they had lost during the war by their neglect of science. They must,

he said, turn at once to the great question of the dye industry, because the whole achievements of Germany as a nation of chemical experimenters began from the development of the dye industry. Germany first got the dye industry about the middle of the last century, when, after a distinguished young German chemist named Hoffmann had spent some seventeen years at Oxford University, after having profited by the experiments and discoveries first made in aniline dyes by Professor Perkins, he returned to his native country, where he got support from the Government, whereas Professor Perkins got no financial help beyond that afforded by his father. By 1878 German dyes were coming to England in large quantities, and while Perkins got numerous letters from dyers and others, not one put his hand in his pocket to help him. The only way in which they at home could hope to establish industries was by following the lesson taught them by Germany, by paying their chemists on a scale commensurate with the value of their work, and by the Government so encouraging the physical sciences, and especially chemistry, that the country would be kept on a level with that of any nation likely to wage war against it.

New Source of Hydrocyanic Acid

Researches by an Indian Chemist

Professor P. P. Bedson presided over a general meeting of the Newcastle Section of the Society of Chemical Industry, on November 19, when a paper by Mr. Sen Gupta, B.Sc., was communicated by Mr. S. H. Collins, F.I.C., on "The Generation of Hydrocyanic Acid and the Properties of the Fat from the Seeds of Schleichera Trijuga, an Indian tree." The paper was written whilst the author was a student at Armstrong College, and was the thesis upon which he gained his B.Sc.

Analysis of the Seed

Schleichera Trijuga, according to the paper, is a large deciduous tree distributed over an area of considerable variations in temperature. It was met in all dry forests throughout India, Burmah and the Indian Archipelago. The work embodied in the paper fell under three heads—(1) a general survey of the constituents of the various parts of the fruit from the feeding point of view; (2) a study of cyanogenesis in the seed; (3) examination of the fat. Mr. Sen Gupta dealt chiefly with the second head owing to its special scientific interest, and the bearing on the extent to which the fatty and non-fatty elements of the seed might be used as articles of commerce in view of the extreme toxicity of the hydrocyanic acid which, in the absence of suitable precautions, might be present as such in the fat or locked up in the parent substance in the residue, and capable of being liberated under favourable conditions. Regarding the analysis of healthy seeds, it was noted that the percentage of HCN yielded by the seed under favourable conditions of hydrolysis had been .574 per cent., which corresponded to .298 per cent. of nitrogen. The probable composition of cake from expressed seeds he gave as moisture 8.28; oil, 14.99; albuminoids, 47.07; carbohydrates, 15.88; fibre, 8.79; ash, 4.99. Dealing with the question of hydrolysis, he considered it was hardly conceivable that HCN could be present in the seed in a preformed state. The hydrolysis under quite different conditions was quite typical of enzeme activity. At least two products of hydrolysis had been detected, namely HCN and dextrose which had been qualitatively examined. Mr. Sen Gupta described the experiments and apparatus used for determining the evolution of HCN under different conditions of hydrolysis by colorimetric and volumetric estimation.

Effects of Thermal Conditions

In the section dealing with the effects of thermal conditions he had discovered that a temperature of 25° C. was more favourable for the activity of the enzeme present than that of 45° C. Even at 90° the action was by no means nil, but it spread over a short period of time the enzeme activity stopping altogether within forty-five minutes of the beginning of the experiment. Coming to the more practical aspect of the question of inhibition due to wet heat, observations were made on the effect of steam blown through ground material. The result of a rather elaborate experiment was that the subsequent examination of the steam treated material failed to detect the minutest trace of HCN. It was evident that the evolution of HCN in that case was a matter of a few minutes before the steam had its full effect, and that the steam carried away what little HCN was generated, leaving the material perfectly innocuous. Experiments on whole seeds were equally satisfactory. So far as the effect of dry heat was concerned the power of the enzeme to resist the effect of dry heat was very considerable. Similar treatments for longer periods, however, showed that dry heat, though slower in action, eventually overpowered the enzeme and the ultimate defeat of the enzeme was full of meaning, and it would be well to remember the claims of dry heat for its simplicity and practicability.

Action of Ether on Enzeme

The extent to which ether checked the activity of enzeme was remarkable. Quantities of the ground material varying from 2 to 3 gm. were percolated with redistilled ether for different lengths of time, and the extracted material, freed from ether by exposure, was then examined in the usual way at 35° C. and 25° C. The results in all cases were highly satisfactory, the evolution of HCN being either nil or so low as to be hardly measurable in view of the comparatively large quantities of the material used. The extracted material on keeping became still more innocuous; three gm. of material extracted for 2½ hours and then exposed to the atmosphere for a period of twelve days failed to evolve any HCN. As the body temperature of live stock could be roughly taken as 39° C. it was obvious that such ether extracted material would be quite safe for feeding purposes. As to the effect of petroleum ether on enzeme the results of two experiments, although not scrupulously concordant, demonstrated clearly that petroleum ether possessed an inhibitory power which demanded serious consideration on account of the cheapness of the solvent and its extensive use for the extraction of fats and oils. Carbon di-sulphide was very effective in checking the activity of the enzeme as was carbon tetrachloride. An experiment with ethyl alcohol on enzeme showed that for four hours' examination not the slightest evolution of HCN was detected.

67 per cent. of Fat in the Seed

Dealing with the fat of the seed, it was pointed out that Lewkowitsch and others had already dealt with that aspect though not with the cyanogenesis. The seed contained as much as 67 per cent. of fat, a percentage which almost constituted a record in the vegetable kingdom. The fat was known as Kon oil, Kusum oil, Macassar oil, &c., the last of which had a large currency in commerce. The result of examination for iodine values on the same three samples resulted in 52.4, 55 and 54.6 respectively. The acid value varied with the source of the fat.

Discussion

In the discussion which followed, Professor Bedson asked whether Mr. Sen Gupta had tried the effect of solvents such as di-chlor-ethylene which he understood were used in industry for the extraction of fat from seeds.

Mr. Collins, who replied for the author, said that di-chlor-ethylene was not employed. Having tried petroleum ether he did not think the results would be dissimilar.

Mr. A. Short said that at first sight it seemed rather startling to learn that foodstuffs could generate prussic acid. He would like to ask whether any cases had happened where death had been caused by lack of treatment or through wrong treatment of foodstuffs.

Mr. Collins replied that the question of the development of prussic acid in foodstuffs cropped up periodically. There had been a number of cases of calves being poisoned by prussic acid developing in foodstuffs and a certain, though much lower, number of cases of cows. When cattle food was boiled or even soaked in boiling water the enzeme was completely destroyed. If the foods were carefully mixed little harm would accrue. He was of opinion that a new cake put upon the market without a guarantee of freedom from the possibility of developing prussic acid would have little success.

Society of Chemical Industry

Newcastle Section's Visit to Elswick Gas Works

About forty-five members of the Newcastle Section of the Society of Chemical Industry paid a visit to the Elswick works of the Newcastle and Gateshead Gas Company last Saturday, and were shown round by Mr. T. Hardie (engineer), Mr. Atkinson (Elswick manager), Mr. G. Weyman (chemist), Miss Wallace, Messrs. Walker, Hoovey, Kimpson, and Cumming. After visiting the works, the visitors were entertained to tea by the company and cordial votes of thanks were accorded the management and guides.

Developments since 1859

The trip round the works was of absorbing interest, and to those who remembered that gas was first made there in 1859 with a carbonising plant of four benches of eight ovens (seven retorts), the progress seen in the modern plant was little short of marvellous. The works, under the old system, reached the maximum output in 1895, when nearly 5½ million cubic feet of gas was made in twenty-four hours, and the output for the year was 1,140 million cubic feet.

The reconstruction scheme was decided upon in 1911, and in December of that year a tender for the installation of vertical retorts on the Glover-West system was accepted. The demolition work was started on January 8, 1912, and by March a start was made with the brickwork. No. 1 vertical house consists of ten settings, each of eight retorts. The producers were originally of the ordinary horizontal bar type and the producer gas was passed into two vertical flues from which supplies were taken, the heated secondary air, passing round each half of the setting, horizontally, and returning to the front where the waste gases from all the horizontal chambers were collected in two vertical flues which conducted them into the top chambers of the setting. Thence they flowed through two chambers, round the retorts, to the other side of the setting into the chimney. During the war, however, the step grates were installed. The chief features of No. 2 retort house are twelve settings with step-grate producers, and the gases are passed straight from one side of the setting to the other and do not return to the producer side of the chamber again till the third chamber from the top is reached, this resulting in equality of heating in each side of the retorts. A considerable increase in output per retort is thus obtained without

injuring the refractory materials of which the retorts and combustion chambers are made.

Improved Storage Accommodation

The storage of coal is vastly superior in No. 2, forty-eight hours' supply being charged in the hoppers as against twenty-four in No. 1. The coal breakers are conveniently placed under the floor of the coal-store and nearly 600 tons, without trimming or tipping, gravitate from the store. There are two coal breakers and two elevators, each having a capacity of thirty tons per hour. The coal conveyors are of the push-plate type, with a capacity of thirty tons per hour. The coke handling plant is most efficient. The coke is discharged into skips, the method of working being to discharge four retorts into one skip, which is picked up by the telpher. Ashes are similarly disposed of. There are three sets of overhead storage hoppers, including a ferro-concrete hopper, and the "jigger" screen has a capacity of forty tons per hour. The whole of the machinery is driven by electric motors—the electricity being generated by three sets of gas engines and dynamos. The purifying house contains eight overhead purifiers. The boxes are of the usual construction and worked in two sets of four each with Weck valves. The water storage tank has a capacity of 30,000 gallons, and is erected on the reinforced walls of the old engine house. The shops, stores and offices are admirably laid out and most convenient. Four gas-compressors have been installed for high pressure gas to the town and to an outlying district.

Progress of Agricultural Chemistry

Paper by Mr. F. H. Walker

A PAPER on "Soil Bacteria" was read at a meeting of the Chemical Industry Club, Newcastle, last week, by Mr. F. H. Walker, A.I.C. Mr. Q. Smalley, the president of the Technical Section of the Club, presided.

Mr. Walker gave a short resumé of the progress of agricultural chemistry up to about 1860, when it almost came to a standstill when the theories of Leibig on the mineral constituents absorbed by plants from manures had been found to be only partially true. Leibig maintained that ammonia and not gaseous nitrogen was taken up by plants. After a great controversy, the experiments of Lawes, Gilbert and Pugh proved that all non-leguminous crops thrived when treated under proper conditions with nitrogenous fertilisers and died when deprived entirely of combined nitrogen despite the other mineral constituents being present. It was found that peas and clover could thrive without nitrogenous manure, and the soil in which they grew actually became richer in nitrogen, and the amount brought down by rain failed to account for it all. Thanks to Pasteur, the science of bacteriology made rapid progress. Pasteur appeared to have recognised that the change of ammonia to nitrate in soil was a bacterial process. In 1887, Schloesing and Muntz remarked that when a stream of sewage was allowed to trickle down a column, after a lapse of twenty days, the ammonia in the sewage began to convert to nitrate and finally was completely converted. The procession of conversion was stopped by adding an antiseptic, and could be restarted by an addition of turbid water extract of dry soil. The "nitrification" was due to bacteria. Later experiments showed that nitrification took place in two stages and that there were two organisms. Beijerinck eventually isolated *B. radicicola*, and the conclusion was generally accepted that bacteria are the real makers of plant food in the soil.

Acidity in Soils

After discussing the value of farmyard manure from a bacteriological standpoint, Mr. Walker considered that acidity in soils might be caused by the prolonged use of sulphate of ammonia when not properly corrected by lime. In rich soils the bacteria might be greatly reduced in number by protozoa. *B. radicicola* could not live in acid soils or in land rich in nitrates, and Bottomley had finally selected peat as a suitable material for distribution. Raw peat was treated with steam and afterwards inoculated with a mixed culture of *B. radicicole* and *azobacter chroococcium*, and remarkable successes were obtained. The attempt to put bacterised peat on the market as humogen had not been altogether successful. Mr. Walker described many of the experiments of Bottomley and Rosenheim.

A long and informal discussion followed.

THE BOARD OF TRADE announce that the Controller of Coal Mines has suspended those provisions of the Household Fuel and Lighting Order, 1919, which limited the quarterly consumption of users of gas and electricity. The provisions requiring that anthracite, coke and briquettes should be obtained only from the merchant or dealer with whom the consumer is registered have also been suspended.

THE BOARD OF TRADE have been informed by the High Commissioner for Australia that the importation into Australia of dyes of whatever origin from the United Kingdom will be permitted, subject in the case of foreign dyes exported from United Kingdom stocks, to the production of the usual officially certified copy of the British Customs Specification (Form 30) or Shipping Bill (Form 64) whichever is applicable.

Seizure of Pyrogallic Acid

ON Tuesday, in the King's Bench Division, Mr. Justice Sankey had before him the important test action concerning the seizure of pyrogallic acid under a proclamation dated June 25 of this year. The suit was by the Crown by information for the condemnation of six packages of pyrogallic acid consigned to and imported into Manchester by the defendant, John Brown, trading as Brown & Forth, chemical manufacturers, of Dolefield Bridge Street, Manchester, and Farringdon Road, London, and seized on August 28 by the Customs officer at Manchester.

The Attorney-General (for the Crown) said the suit was for condemnation of the goods in question, which the Crown claimed to be forfeited, as having been imported into the country contrary to the Prohibition of Imports No. 32 Proclamation of 1919. He gathered that the real point of law was whether the Proclamation in question was properly made. It might be that on a certain view of the facts, that might become unnecessary to be decided. The Proclamation was made under Section 43 of the Customs Consolidation Act of 1876 relating to the importation of certain goods into the United Kingdom, and this section provided that the importation of arms, ammunition, gunpowder, or any other goods might be prohibited by Proclamation. The Proclamation followed the section in question and prohibited the importation of "chemicals of all descriptions" unless imported by licence of the Board of Trade. This was the thirty-second Proclamation of the kind, and since the war began the same interpretation had been put on the section. The Proclamation was issued on June 25 of this year. On August 17 these packages of acid were imported into Manchester by the defendant, and on August 28 they were seized by the Customs officer. Notice of seizure was given the defendant and in reply he wrote on September 1 pointing out that the acid was ordered from a Canadian chemical works before the regulations under which it had been seized were enacted.

His Lordship said Counsel might be right in saying that under the Order in Council the whole of the free imports of the country could be stopped, but that argument, if it was right, was a little astonishing.

The Attorney-General contended that the Proclamation was lawfully made and that the acid was properly seized.

Mr. Wright (for the respondents) said the real issue here was whether by the Act of 1876, which repealed the Act of 1856, the legislature vested in the Executive by section 43 the absolute power at their discretion to reverse and abrogate the policy there indicated and to substitute limited or unlimited power and restriction over imports and exports. This acid was a commercial substance for ordinary commercial use. His submission was that under the circumstances of this case this acid did not come within the powers which the Crown had here exercised. Counsel cited a number of cases in support of his submissions and the further hearing was adjourned.

Future of the Spelter Industry

AT a meeeting last week of the Birmingham Section of the Institute of Metals, Professor Turner read a paper on the spelter industry. He said the chief use of spelter was in the galvanising trade; the value of the galvanised iron produced annually in Great Britain before the war was about £10,000,000. Next in importance was the production of brass and other alloys; while the third great application was in the form of rolled zinc for the production of sheets, wire, and other purposes, for which its lightness and power to resist atmospheric conditions, and relatively low cost, rendered it specially suitable. The supply of spelter in this country was a question of national importance alike in times of peace or of war, and it was obvious that it would be to the advantage of the country to produce as large a quantity of its own spelter as was possible. In 1913, the last normal year, the world's output of spelter was nearly one million tons, of which 320,000 were produced in America, 283,000 in Germany, and 198,000 in Belgium. The United Kingdom absorbed about 200,000 tons, and produced about one-third of this quantity. At Avonmouth, during the war, a large model plant was designed, and was partly erected when the Armistice was signed. Progress had since been slow, or almost completely arrested. It was stated that more than £500,000 has already been expended. The general layout of the works was bold, and worthy of commendation.

The special circumstances under which this undertaking was begun had now happily passed away, but it was to be hoped that the expenditure would not have to be regarded merely as a war loss, but that some means would be forthcoming whereby at least a considerable part of what had been thus provided might be utilised for the general good. The economic production of zinc in Great Britain was largely a question of price. Before the war the price of spelter stood at £24 a ton, in 1915 it jumped to four and a half times its pre-war value, and after November, 1918, the price fell, and American zinc was sold in this country at £35 a ton. As a temporary expedient the Government came to the aid of British smelters, but if an industry was to be of value to the nation it must be conducted on a competitive and self-supporting basis. It had been stated by the manager of a large firm that under good management, and in a well-designed plant, spelter could be made in Great Britain and sold profitably at a price of £45 per ton. Professor Turner was of the opinion that American prices would rise, Germany and Belgium would not be in a position to compete at anything like pre-war prices, and therefore the British manufacturer would be able to meet foreign competition.

From Week to Week

WHAT IS BELIEVED to be a large deposit of graphite has been discovered in the mountains in the neighbourhood of Bethesda.

IT IS STATED that German colouring matters may now be imported into France free of import duty.

DAMAGE ESTIMATED AT between £300 and £400 has been caused by fire at an oil store at West Park, Cupar, belonging to the Oakbank Oil Co.

MR. J. W. HOPE, of Messrs. John Knight, Ltd., soap manufacturers, has been appointed to the Central Committee of the Profiteering Act Department.

WHILE FOLLOWING HIS employment at Briton Ferry Chemical Works, a man named Tom Faulkner fell from an acid tower, a distance of 30 ft., and received severe injuries.

DYESTUFFS AMOUNTING TO £2,308 were exported from Leeds to America during the quarter ended September 30 last. None were exported in the corresponding period last year.

WE UNDERSTAND THAT, owing to its rapidly increasing membership and in order to minister to the comfort and convenience of members and visitors, a paid assistant secretary has been appointed by the Chemical Industry Club, as from December 1.

AT THE BRISTOL POLICE COURT last week, S. J. Fry was fined £5, for receiving, and J. Goding and E. Butler £3 each, for stealing a quantity of calcium carbide, of the value of £12 10s., the property of Messrs. Jenkins, Hill & Co., Commercial Road, Bathurst Basin, importers.

THE BATH SANITARY COMMITTEE have decided to make no fresh appointments to the post of City Analyst, vacant by the resignation some months ago of Mr. S. W. Gatehouse, but to recommend the City Council to arrange for the analyst to the Somerset County Council to act in the same capacity for Bath.

MR. JOSEPH WATSON, the former well-known Leeds' soap manufacturer, and Mr. L. C. Paget, a director of the Olympia Oil Works at Selby (Yorks), both of whom have severed their connections with the last named works, have been presented by Selby employés with pieces of silver plate.

THE PETROL CONTROL DEPARTMENT, 20, Berkeley Street, W. 1, will be closed on November 22. All further communications in connection with the matter hitherto dealt with by that Department should be addressed to Mr. P. G. L. Webb, C.B., C.B.E., at the Patent Office, 25, Southampton Buildings, Chancery Lane, W.C. 2.

A FURTHER BIG increase of charges in connection with the bleaching and dyeing of cotton textiles, to come into operation immediately was announced on Wednesday by the Bleaching Trade Advisory Board. Bleaching charges are to be increased by 25 per cent., and dyeing charges by 10 to 30 per cent., making in case of bleaching a total of 150 per cent. over pre-war rates.

ACCORDING TO *Stubbs' Weekly Gazette*, the failures in the United Kingdom for the week ended November 22 were 31, an increase of 14. The numbers of bills of sale registered and re-registered was 156, an increase of 85. Mortgages and charges registered by limited companies amount to £1,195,852, the amount authorised (where stated) being £313,250.

ACCORDING to the United States Bureau of Mines Report, the new plant at Amherstburg, Ontario, Canada, at which sodium carbonate is to be made by the Solvay process, is expected to supply all of Canada's needs for soda ash. The capacity of this plant is reported to be about 120 tons per day. Some glass sand is being secured from Oneida Ontario, but it is said to be of an inferior grade, and only suitable for the manufacture of the cheaper grades of glassware.

AT THE SECOND MEETING of the Edinburgh and East of Scotland Section of the Society of Chemical Industry held in the Cockburn Hotel, Edinburgh (Dr. D. S. Jerdan in the chair) a paper by Messrs. A. T. Adam and F. S. Merrils, of Messrs. Brunton's Research Laboratory, Musselburgh, was read on "The Measurement of High Temperatures." The paper was illustrated by lantern slides, and was followed by a discussion.

THE FOLLOWING DEMONSTRATORS in chemical technology (Faculty of Technology) have been appointed at Manchester University:—Mr. Michael Barash, M.Sc.Tech.; Mrs. May Craven, M.Sc.Tech.; Mr. R. L. Grant, R.Sc. Tech.; Mr. A. Hancock, F.I.C.; Mr. G. G. Hepburn, B.Sc., Ph.D. (special demonstrator); Mr. Burrows Moore, M.Sc. Tech.; Mr. A. B. Middleton, A.M.S.T. and A.R.S.M. (demonstrator in metallurgy); and Miss Marion Chadwick, A.M.C.T. (demonstrator in brewing).

PROFESSOR J. C. MCLENNAN, whose services have been lent to the Admiralty by the University of Toronto since 1917, and who, since January last, has been acting as Scientific Adviser to the Board of Admiralty, has found it necessary to return finally to his duties as Professor of Physics and Director of the Physical Laboratory in the University of Toronto. Professor McLennan rendered most important services to the Admiralty, particularly in connection with the development of helium gas.

A HOME OFFICE ANNOUNCEMENT explains the effect of "The Explosives in Coal Mines Order of November 14, 1919," which comes into force on January 1, 1920. The Order revises the permitted list of explosives by omitting from the list those which are not being manufactured at the present time, and consolidates the remainder in one complete list by substituting the schedules attached to the new Order for those attached to the old Order of September 1, 1913, and its amending Orders.

REFERRING TO THE RECENT disastrous fire at the oil reservoirs at Grozny (Russia) station, the Board of Trade Journal states that the fire was caused by carelessness, as a warning issued by the Department of Ways and Communications to clear the railway lines and station-yards of spilt naphtha, was disregarded. All the oil belonged to the Vladikavkaz Railway Company, which has incurred losses aggregating tens of millions of roubles. The stocks of oil amounting to several hundred thousand tons belonging to private firms were not touched by the fire.

ONE OF THE FEW PLACES where a plant has already been installed for the distillation of oil from shale is near Dillon, Montana, states the United States Geological Survey. The shale at the site selected for the operations is a part of the phosphate formation, which contains the beds of rock phosphate that are mined at several places near Bear Lake, in south-eastern Idaho, for the manufacture of fertiliser. Phosphate beds are also associated with this shale in the vicinity of Dillon, and although they are neither so thick nor so rich as the beds in south-eastern Idaho, they have some prospective value.

AT THE LAST GENERAL MEETING of the Newcastle section of the Society of Chemical Industry, Professor P. P. Bedson, chairman, said that the Committee had recommended the members to invite the Society of Chemical Industry to hold its next annual meeting in Newcastle. A similar invitation had been extended to the Society last year, but other arrangements had already been concluded. The annual meeting has already been held in Newcastle in 1884, 1899 and 1908. He formally moved the resolution from the chair, which was seconded **by** Mr. S. H. Collins, M.Sc., and unanimously carried.

SOUTH WALES AND Monmouthshire Pharmacists' Local Associations' Federation held their quarterly meeting at Haverfordwest last week. It was decided to send a circular to the branches for consideration, asking doctors to give up as much as possible of their private dispensing and hand it over to the chemists, on the latter undertaking to give up prescribing. With regard to the claim by chemists for an increase of 50 per cent. in the fees allowed for dispensing under the National Health Insurance Act, it was explained that the Government had not granted the terms asked, nor had they refused them. The Pharmaceutical Association had decided to send a deputation to the Government to state what they wanted and to ask for a settlement. Failing a satisfactory settlement within the next month, they would go direct to the Ministry of Health. The President (Mr. F. D. Phillips) said that a North Wales Federation was being formed, and this would ultimately join with them, and they would have the annual meetings alternately in North and South Wales.

OWING TO THE DEMAND in Europe and America for coconut- and copra, states a *Times* correspondent at Kingston, B.W.I., there has been a big increase in the price of coconut oil in the West Indian colonies. In Jamaica the retail price of this kind of oil is about 16s. per gallon—fully double what it was in pre-war days. In Trinidad the price is about 10s. per gallon; and there is said to be a scarcity of the article. A tax was imposed by the Government of that colony, on the recommendation of the Food Committee, with the object of reducing the price of copra so as to allow manufacturers to sell oil at a reasonable price and to retain sufficient copra in the colony for the manufacture of oil to satisfy the needs of consumers. The object of the tax was attained. The Food Committee has been informed that owing to the high prices now ruling for coconuts only "egg" nuts are being used for making copra, so as to ensure a supply of oil for local requirements. The Government, according to a letter submitted to the Chamber of Commerce, was asked to prohibit the export of copra so long as the present conditions continue, instead of levying a heavy export tax on the article, as was done in the first instance. The Chamber of Commerce, at its September meeting, appointed a committee to advise the Government on the best way out of the difficulty.

Obituary

MR. H. E. STONER.—Mr. H. E. Stoner, managing director of the Vacuum Oil Co., Ltd., died on Tuesday at his residence at Walton-on-Thames, of heart failure, after a long illness. Mr. Stoner, who was in his 55th year, had been connected with the Vacuum Oil Co. for a number of years, and became managing director in 1912.

Chemical Matters in Parliament

Oil Cakes

Major Kelley asked the Minister of Food (House of Commons, November 20) if he were aware that a large quantity of oil cake had been stored in malt kilns at Wath-on-Dearne since August of last year; and, seeing that the oil cake was of less feeding value now a winter had passed and rent was still being paid, he would inquire into the matter.

Mr. McCurdy: The oil cake referred to formed part of the stocks maintained by the Ministry in various inland stores. It has now been sold and will be removed within the next fortnight.

German Dyes

In reply to Major M'Kenzie Wood (House of Commons, November 24), Sir A. Geddes stated that no dyestuffs had so far been received from Germany under the Reparation Clauses of the Peace Treaty, though consignments were now on the way. The values to be credited to Germany were to be fixed by the Reparation Commission, subject to certain conditions, but he understood that the Commission had not yet come to a definite decision on the matter.

British Dyestuffs Corporation

Major Barnes asked the President of the Board of Trade (House of Commons, November 25) if the agreement of May 16, 1919, made between the President of the Board of Trade and the Trustee of the British Dye Stuffs Corporation on June 16, 1919, was ratified by the British Dye Stuffs Corporation; by whom the proposal to modify the agreement was made; what were the grounds advanced in support of the modification; and on what date was the share capital subscribed for by the Government?

Sir Auckland Geddes: The answer to the first part of the question is in the affirmative. Suggestions as to the modification of the form of Government financial assistance were made to the Board of Trade, mainly by representatives of the dye-using interests, on the ground that though the Government were urging those interests to give financial support to the development of the dye-making industry in this country because of its national importance, the Government were not participating in the risks, but were taking ample security for their advances, thus throwing the whole risk upon the consumers. The Government subscription for shares, as I have already explained, was an alteration in the form of the Government's financial assistance to the dye industry in this country. This alteration was made on July 17 of this year.

Major Barnes asked the President of the Board of Trade (House of Commons, November 27) if any legal instrument exists embodying the modified terms of the agreement between the President of the Board of Trade and the British Dyestuffs Corporation; and if he will give the date on which the same was executed and the names of the parties thereto.

Mr. Bridgeman: No, sir. The earlier agreement is still operative so far as it is applicable in the changed circumstances.

Petrol Price

Mr. Bridgeman, replying to Lieut.-Commander Chilcolt (House of Commons, November 25), stated that the average retail selling price of petrol per gallon in tins in November, 1918, was, in England and Wales, 4s.; the corresponding price in May, 1919, was 3s. 0½d., and the current average retail price is understood to be 2s. 11½d. per gallon. Petrol has already been declared to be an article in common use under the terms of the Profiteering Act, and the provisions of that Act accordingly apply to it.

Government Contracts

THE following contracts were placed by the Government during October:—

MINISTRY OF MUNITIONS (WAR OFFICE CONTRACTS).

Disinfectants: Heppell's Insectox Laboratories, London, W.
Polish: Day & Martins, Ltd., London, E.

INDIA OFFICE: STORE DEPARTMENT.

Acid, Boric: Howards & Sons, Ilford.
Argenti Nitras: J. Matthey & Co., London, E.C.
Asbestos: Turner Bros. Asbestos Co., Ltd., Rochdale; Bell's United Asbestos Co., Ltd., London, S.E.
Barium Chlorate: T. Tyrer & Co., Stratford.
Chemicals: Carnegie Bros., London, N.; W. J. Bush & Co., Hackney, N.E.; Whiffin & Sons, London, E.C.; May & Baker, Ltd., Battersea, S.W.; F. W. Berk & Co., Ltd., Stratford, E.; T. Tyrer & Co., Stratford, E.
Chloroform: Duncan, Flockhart & Co., Edinburgh.
Cresol: Jeyes Sanitary Compounds Co., Ltd., London, E.C.
Glyceriuum: Price's Patent Candle Co., Battersea.

CROWN AGENTS FOR THE COLONIES.

Asbestos Sheets, Slates, &c.: British Fibro-Cement Works, Ltd., London, E.C.
Cement: Associated Portland Cement Manufacturers, London, E.C.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 4, Queen Anne's Gate Buildings, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
Vancouver	Iron Oxides and Lithopone. Replies to Canadian Government Trade Commissioner's Office, Portland House, 73, Basinghall Street, E.C.	
Canada	Molybdenite and Tungsten Concentrates (for disposal). Reply as above.	
Canada	Asbestos Millboard (for disposal). Reply as above.	
Canada (Toronto) ..	Drug Specialities	1,092
New Orleans (Louisiana)	Chemicals	1,135

Contracts Open

PORTLAND CEMENT.—For Aberdeen Town Council (Police Dept.). Particulars from the Burgh Surveyor's Office. Tenders by 10 a.m. December 8.

PORTLAND CEMENT.—For Brighton Town Council. Particulars from the Borough Surveyor, Town Hall, Brighton. Tenders by 10 a.m., December 5.

OILMAN'S STORES.—For Gravesend Education Committee. Particulars from the Town Clerk's Office. Tenders by 10 a.m., December 1.

TAR.—For the Roads and Bridges Committee of the West Sussex County Council. Persons tendering should give the following particulars:—(*a*) Specific gravity; (*b*) percentage of water ammonia, and free carbon; (*g*) percentage of tar produced in the manufacture of carburetted water gas. Tenders to Mr. H. W. Bowen, M.I.C.E., County Surveyor, North Street, Horsham, by December 1.

RAILWAY STORES.—(15) Paints, oils; (17) Petroleum; (26) Portland cement; (23) ship chandlery. Particulars from Mr. N. Proud, secretary, Port and Docks Office, Westmorland Street, Dublin. Tenders by December 10.

Professor Frankland Awarded the Davy Medal

PROFESSOR PERCY FRANKLAND, F.R.S., who formerly occupied the chair of chemistry at the University of Birmingham, has been awarded by the Council of the Royal Society the Davy Medal in recognition of his extensive research work in chemistry. Professor Frankland succeeded Professor W. A. (now Sir William) Tilden as Professor of Chemistry at the Mason College, Birmingham, in 1894, and subsequently became Dean of the Faculty of Science at the Birmingham University. During the war he undertook a good deal of research work, his services being enlisted by the Italian as well as the British Government. He was a member of a special mission to Italy, in connection with which King Victor conferred upon him the Order of St. Maurice and St. Lazarus. Professor Frankland's father, the late Sir Edward Frankland, K.C.B., was a distinguished professor of chemistry, and his son, Dr. Edward Frankland, obtained a first-class in chemistry in the second part of the tripos at Cambridge.

New Books Received

CHEMISTRY FROM THE INDUSTRIAL STANDPOINT. By P. C. L. Thorne, B.A. Hodder & Stoughton, London. pp. 244. 4s. 6d. net.

PRACTICAL LEATHER CHEMISTRY. By A. Harvey. Crosby, Lockwood & Son. pp. 207. 15s.

INTRODUCTION TO PHYSICAL CHEMISTRY. By James Walker. Eighth Edition. MacMillan & Co., Ltd., London. Pp. 433. 16s.

IN THE SIDE SHOWS. By Captain Wedgwood Benn. Hodder & Stoughton, London. Pp. 310. 12s.

ALCOHOL: ITS PRODUCTION, PROPERTIES, CHEMISTRY, AND INDUSTRIAL APPLICATIONS. With Chapters on Methyl Alcohol, Fuse Oil and Spirituous Beverages. By Charles Simmonds, B.Sc. Macmillan & Co., Ltd., London. Pp. 574. 21s.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

FLASH-LIGHTS. Notes on aluminium flares. E. H. Brittain. *Chem. and Drugg.*, November 22, 1336. Several formulæ for preparing aluminium powder mixtures for signalling and like purposes are given.

GAS. Admixture of blue water gas and coal gas. H. J. Randall. *Gas World*, November 22, 405-407. The author describes experiences at Yorktown in a paper before the Southern District Association of Gas Engineers, November 20.

After five years of war. H. W. Woodall. *Gas World*, November 22, 407-409. A general review of the present condition of the gas industry.

A new heat value indicator for gasworks' use. E. J. Brady. *Gas World*, November 22, 410-412. The author describes a new apparatus for determining the calorific value of certain combustible gases.

Progress in steaming retorts. L. J. Willien. *Gas J.*, November 18, 377-378. Some American tests are described.

METALS. The Brinell and scratch test of hardness. W. C. Unwin. *Engineering*, November 21, 669. A new formula for the scratch test values is suggested.

Materials for the exhaust valves of internal combustion engines. J. E. Hurst and H. Moore. *Engineering*, November 22, 672-674. The suitability of the various metals is considered

SCIENCE. Chairman's address to the Royal Society of Arts. H. T. Wood. *J. Roy. Soc. Arts*, November 21, 3-13. The applications of science to industry are dealt with, among other topics.

STEEL. The hardening of steel. H. C. H. Carpenter. *Chem. News*, November 21, 235-238. A useful general paper.

WASTE HEAT RECOVERY. Theoretical principles involved and practical points in connection with steam raising. Alwyne Meade. *Times Engineering Supplement*, November 21.

American

ANALYSIS. An electrometric method for the determination of ferro-cyanides depending on the change in oxidation potential. G. L. Kelley and R. T. Bohn. *J. Amer. Chem. Soc.*, November, 1776-1783.

The determination of zirconium by the phosphate method. G. E. F. Lundell and H. B. Knowles. *J. Amer. Chem. Soc.*, November, 1801-1808.

MINERAL OILS. Facts about motor gasoline testing. G. A. Kramer. *Petroleum*, November, 20-21. The distillation test is recommended as giving the most useful practical results.

Practical method for calculating viscosity of hydro-carbon oil mixtures. W. E. Espy. *Petroleum*, November, 27-28.

Gas engine lubricating oils. *Petroleum*, November, 45-47. Useful notes on the selection and use of these lubricants.

PAINTS. The hiding power of white pigments and paints. A. H. Pfund. *J. Franklin Inst.*, November, 675-681. A method and apparatus for obtaining numerical values for the true "hiding power" are described.

French

ACROLEIN. Preparation of acrolein. C. Moureu and A. Lepape. *Comptes rend.*, November 17, 885-889. The authors have found a mixture of potassium sulphate and bisulphate to be the most suitable catalyst.

ANALYSIS. Separation of iron, aluminium, chromium, bismuth, titanium, and zirconium by the sodium carbonate method. P. Wenger and J. Wuhrmann. *Ann. Chim. Analyt.*, November 15, 337-339.

STEEL. Physical defects of steel in forged articles. A. Portevin. Pamphlet issued by *Rev. Mét.*, 23 pages and 15 plates. The causes and detection of the various kinds of defect are dealt with.

German

ANALYSIS. Electrometric analyses with potassium ferro-cyanide. E. Müller. *Z. angew. Chem.*, November 4, 351-352.

FATS. Chemistry and industry of fats in 1914-1918. A. Grün. *Chem. Zeit.*, November 4, 758-760. Further notes on the constituents of fats are given. (See also CHEMICAL AGE, pp. 601, 623.)

HYDROGEN. Progress of the inorganic heavy chemical industry during the war. *Chem. Zeit.*, October 30, 745-747. The literature on hydrogen is reviewed in this instalment.

METALS. The Balkans as source of raw material for German metal industries. E. Kepler. *Metall u. Erz.*, October 8, 444-455. The deposits of ores of lead, zinc, silver and gold are enumerated.

MILK. Applications of aluminium in the milk industry. Utz. *Z. angew. Chem.*, November 4, 345-346. Aluminium is shown to be a very suitable material for the purpose.

ORGANISATION. Meeting of the Union for promoting the interests of German chemical industry, October 25th. *Chem. Zeit.*, November 4, 749-751. This account of the meeting contains reports of papers by Frank on "Activity of unions and self-administration," by Horney on "The economic position of the chemical industry," and by Flechtheim on "The new taxation and the chemical industry."

POTASSIUM SALTS. Production of potassium nitrate and ammonium sulphate from crude potash salts. H. Hampel. *Chem. Zeit.*, September 23, 634-636. A cyclic process is suggested.

PYROMETRY. The methods of estimating temperature, their technique and suitability for obtaining accurate results in chemical work. K. Scheel. *Z. angew. Chem.*, November 4, 347-349. A critical discussion of various thermometric and pyrometric methods.

Miscellaneous

ANALYSIS. Colour reactions of molybdenum and tungsten. G. A. Barbieri. *Atti R. Accad. Lincei*, vol. 28, pt. 1, 390-392.

CEMENT. The rapid testing of cements. C. Montemartini and F. Roncali. *Annali Chim., Applic.*, vol. 12, nos. 5-8, 59-73.

TITANIUM. Determination of titanium in some Italian puzzuolanas. A. Cavazzi. *Annali Chim. Applic.*, vol. 12, nos. 5-8, 105-111.

Finnish Chemical Pulp Trade

THE chemical wood pulp (cellulose) market has been very slack during the first half of this year. Besides the general depression in commercial life, this trade has laboured under other disadvantages. The prices were too high in competition against Sweden, and the Finnish political situation was still so uncertain that people generally appear to have been afraid of doing business with Finland. During the month of July, however, a change occurred which made it possible for Finland again to enter the market. The raising of the blockade enabled Finnish concerns to make large contracts with Germany. The low exchange of Finland made it more favourable for Germany to buy from Finland than from Sweden. Since the paper spinning industry in Germany has lost all its importance, it is now impossible to place any sulphate pulp in that country. The Finnish chemical pulp trade has in this way been worked into many different markets, and has, on the whole, been able to hold its position. Until the middle of September 37,500 tons sulphite pulp and 14,200 tons sulphate pulp were sold. Out of this, 16,100 tons sulphite pulp and 2,400 tons sulphate pulp were shipped. The shipments will thus be seen to have been very small in comparison with the quantities sold.—*Finnish Paper and Wood Journal.*

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts of Complete Specifications

112,268. WATER GAS PRODUCERS. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, 27-31, Rue Claude-Vellefaux, Paris. International Convention date (France), December 19, 1916.

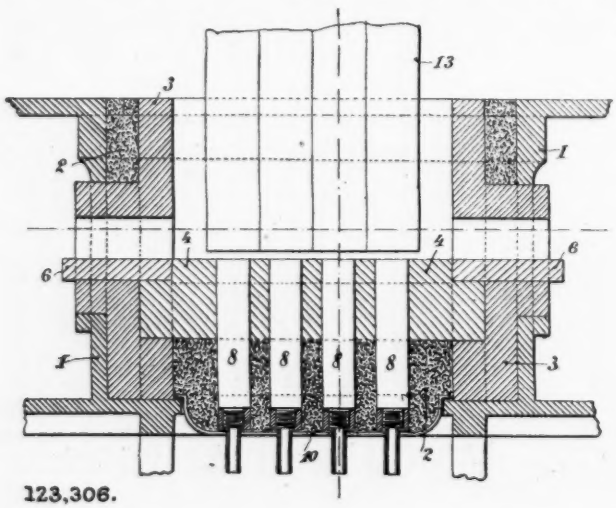
The invention is for the purpose of facilitating the cleaning of the grate and removing the clinker. The producer is made of rectangular internal cross-section, and a diametral rib is provided across the lower end. This rib is triangular in cross-section, and is hollow and perforated for the supply of air and steam to the producer. The rib supports the inner ends of two sets of grate bars, one on either side, and the apex of the triangular bar projects above the grate and supports a false grate. The false grate is composed of bars arranged in two series, inserted through suitable furnace doors, one series resting on the top of the cross bar, and the other series crossing and resting on the first series. The bars are thus sufficiently close to prevent any loss of coke during the removal of clinker.

120,724. WASTE LIQUORS OF THE CELLULOSE MANUFACTURE OR OTHER SIMILAR WASTE LIQUORS, PROCESS OF DRY DISTILLATION OF—WITH STRONG BASES IN THE PRESENCE OF STEAM. E. L. Rinman, 14, Ymervägen, Djursholm, Sweden. International Convention date (Sweden), November 8, 1917.

The raw material treated may comprise: (1) Waste liquors from the soda cellulose manufacture; (2) waste liquors from boiling vegetable substances with caustic soda lye of such strength as to dissolve the cellulose; (3) waste liquors obtained by boiling the liquor from sulphite cellulose manufacture with lime; and (4) waste liquors obtained by treating vegetable substances with alkalis for the production of fibres. The waste liquor is mixed with a strong base, such as lime, and heated by means of superheated steam up to 200° C. till all water is driven off, then up to 300° C. till all the methyl alcohol formed has been driven off, and finally up to 500° C. till acetone, light oils, and heavy oils are driven off. The products of the reaction are thus obtained separately.

123,306. ELECTRIC FURNACES. Société Electro-Metallurgique Française, 109, Boulevard Haussmann, Paris. International Convention date (France), February 11, 1918.

The furnace casing 1 is lined with powdered heat insulating material 2, kept in position by walls 3, of carbon or other refractory material. The floor of the crucible 4 and the bottom of the tapping opening 6 are of carbon. The upper ends of the conductors 8 are embedded in the floor 4, and the metal terminals 9 may be internally cooled. The lower ends of the conductors 8 are embedded in the insulating material 2, which is kept in position by a metal cup 10, which at the same time permits expansion 13 is the movable electrode. When the furnace is adapted for three-phase alternating current the neutral point connection of the electrodes is in the form of a bar arranged just below the furnace.



123,306.

125,935. ELECTROLYSIS OF ALKALINE CHLORIDES, APPARATUS WITH HORIZONTAL DIAPHRAGM FOR. Norsk Alkali A/S, Trondhjem, Norway. International Convention date (Norway), April 25, 1918.

The cathode and anode compartments are separated by a horizontal grating, supporting a screen carrying a layer of porous material. A frame is embedded in the material close to the wall of the anode chamber, and is packed in by a paste consisting of powdered asbestos, alumina, clay, barium sulphate, or oxide of iron, mixed with water or salt solution. The excessive passage of liquid through the diaphragm, which usually takes place around the edges, is thus avoided.

128,553. β-HALOGEN-ETHYLAMINOBENZOIC ESTERS, PROCESS FOR THE MANUFACTURE OF. Société Chimique des Usines du Rhone, anciennement Gilliard, P. Monnet et Cartier, 89, Rue de Miromesnil, Paris. International Convention date (France), June 20, 1918.

β-Oxyethyl-paramino-benzoic alkyl esters, obtained as described in 128,552 (on p. 648), are halogenated by means of phosphorus or sulphur halides, thionyl chloride or bromide, to produce β-halogen-ethyl-paramino-benzoic esters having the general formula $xCH_2CH_2NHC_6H_4COO.R$, *x* being a halogen and R being an alkyl radical.

128,554. β-ALKYLAMINO-ETHYLAMINO-BENZOIC ALKYL ESTERS, PROCESS OF MANUFACTURE OF. Société des Usines du Rhone, anciennement Gilliard, P. Monnet et Cartier, 89, Rue de Miromesnil, Paris. International Convention date (France), June 20, 1918.

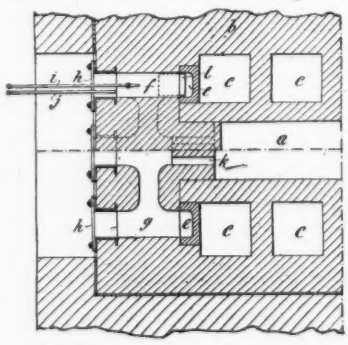
β-Halogen-ethyl-paramino-benzoic alkyl ester produced as in the preceding abstract is heated under pressure with an alkylamine, *e.g.*, diethylamine, to produce β-alkylamino-ethyl-paramino-benzoic alkyl esters.

128,912. BENZOIC ACID ESTERS. Société des Usines du Rhone, anciennement Gilliard, P. Monnet et Cartier, 89, Rue de Miromesnil, Paris. International Convention date (France), June 26, 1918.

Di-β-halogen-ethyl-paramino-benzoic acid esters, having the general formula $(XCH_2CH_2)_2NC_6H_4COOR$, are made by halogenating di-β-oxyethyl-paramino-benzoic esters, as described in 128,553 above. The corresponding di-β-alkylamino-ethyl-paramino-benzoic alkyl esters are obtained by treating the first-mentioned esters with alkylamines under pressure at 100° to 110° C.

133,730. GAS, MANUFACTURE OF—IN VERTICAL RETORTS. G. J. Jackson, Burndell, Esher, Surrey, and Woodall & Duckham, Ltd., Thanet House, 231-2, Strand, London, W.C. 2. Application date, September 10, 1918.

A vertical retort *a* is provided with the usual combustion flues *c*, *c*, adjacent to it in the walls of the setting. A separate vertical

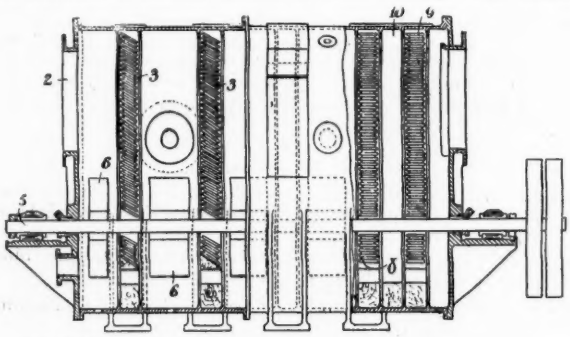


133,730

flue *e* is arranged adjacent to a combustion flue, and oil is sprayed into it at one end by a pipe *i*. The oil is vaporised in passing through the flue, and is then led into the retort by a passage *k* to mix with the gas. Steam may be injected into the oil flue to remove carbon when necessary.

133,987. GAS WASHER. Simon-Carves, Ltd., and J. H. Brown, 20, Mount Street, Manchester. Application date, September 19, 1918.

The gas to be washed enters a horizontal cylindrical casing at 2, and traverses a number of sets of wood slats 3. The rotating



133,987.

shaft 5 carries paddles 6 to spray the washing liquid into the gas between the sets of slats. After being scrubbed by the inclined slats the gas is passed through two sets of horizontal slats 8, 9, separated by a set of vertical slats 10 to eliminate spray. The main circulation of the liquid through the casing is in counter-current to that of the gas.

133,989. PARAFFIN, WAXES, OILS, OR FATS FROM PEAT, PEAT-STRAW, MOSSES, LICHENS, ALGAE, GRASS, STRAW, PINE NEEDLES, AND THE LIKE. K. H. V. von Porat, 4, Vastra Tradgardsgatan, Stockholm. Application date, September 21, 1918.

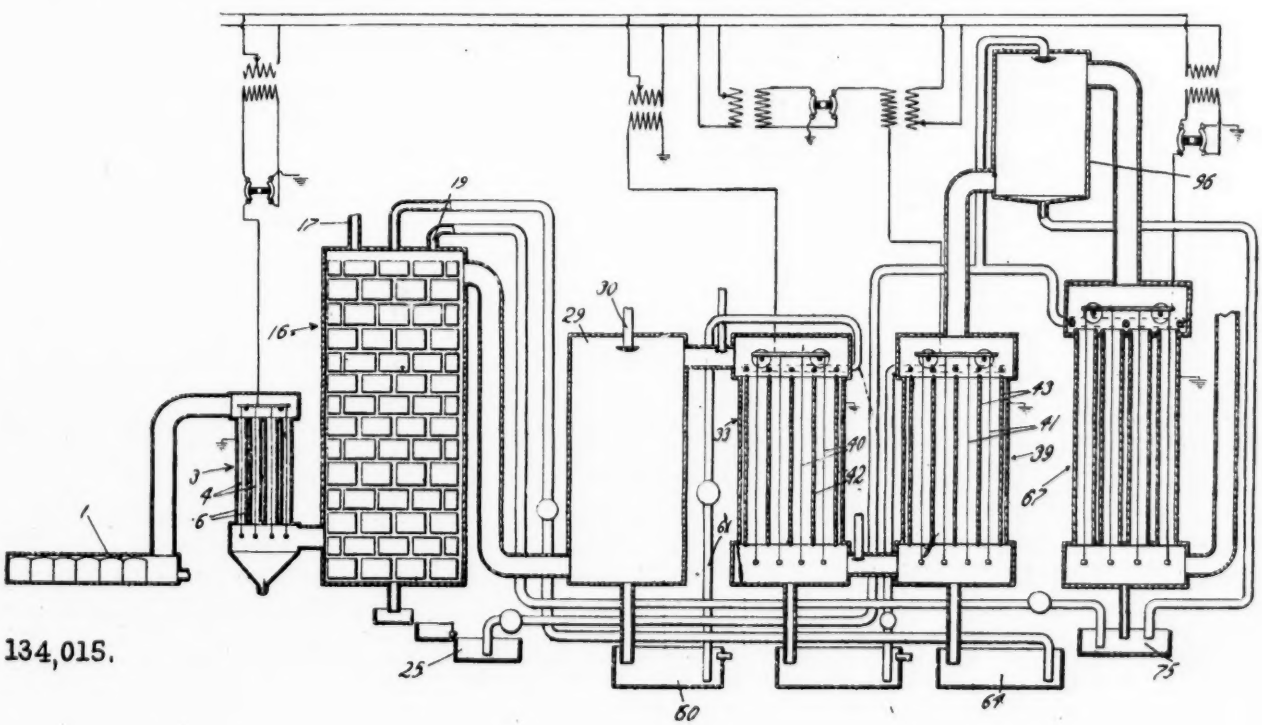
The raw material is heated and extracted under pressure by means of terpenes or their derivatives boiling above 100° C., such as oil of turpentine or some of its fractions.

134,015. SULPHURIC ACID, PROCESS AND APPARATUS FOR PRODUCING. H. V. Welch, 1,645, Orange Street, Los Angeles, Cal., U.S.A. Application date, October 22, 1918.

Sulphur dioxide and air from the furnace 1 pass into the electrical precipitator 3 to remove dust and fume. This device consists of discharge electrode wires 4 passing through collecting electrode tubes 6. The purified gas passes into the Glover tower 16, to which nitric acid is supplied by the pipe 17, dilute sulphuric acid, *e.g.*, chamber acid, by the pipe 18, and effluent (nitrosylsulphuric) acid by the pipe 19. Comparatively strong sulphuric acid is formed, and collects in the receiver 25. The remaining gases pass to the chamber 29, to which steam or water is supplied by the pipe 30, and the usual chamber reactions take place, by which the sulphur dioxide is converted into sulphuric acid. The chamber acid collects in the receiver 50, and the gas, containing sulphur dioxide, oxygen, nitrogen, and suspended particles of nitrosylsulphuric and sulphuric acid, passes on to a pair of electrical precipitators 33 and 39 in series. The units 33 and 39 comprise discharge wires 40, 41, and collecting electrode plates, 42, 43, of comparatively large area. Superimposed high-tension direct and alternating current may be applied to the electrodes, so that a silent electric discharge and a high-potential field are produced between the electrodes. Agglomeration of the suspended particles and precipitation on the plates is effected, whereby the reaction is promoted. At the same time dilute acid is supplied to the plates 42, 43, from the vessel 60 through pipe 61. The residual gas passes from the chamber 39 to the chamber 96, where it meets a spray of strong sulphuric acid from the vessel 25, to absorb oxides of nitrogen and nitrosylsulphuric acid. The resulting mist is precipitated by the electrical separator 67, and is absorbed by strong sulphuric acid from the vessel 25 flowing over the plates 69. This acid collects in the vessel 75, from which it is returned to the top of the Glover tower 16. The units 96 and 67 perform the functions of a Gay-Lussac tower. Dilute acid collects in the vessel 64, and is transferred by the pipe 18 to the top of the Glover tower. The invention ensures (1) uniformity of temperature in the reacting gases by avoiding the usual large lead chambers; (2) effective contact of the reacting substances by means of the electric field; and (3) continuous removal of the resulting acid from the reacting media.

134,113. PRODUCER GAS, GENERATION OF. H. W. Bamber, 166, Piccadilly, London, W. 1, and E. Goldsmid-Abrahams, 5, The Albany Courtyard, Piccadilly, London, W. 1. Application date, December 23, 1918.

A generator for producing gas by passing air and steam through a mass of incandescent coke is provided with means for automatically controlling the water supply in accordance with the temperature of the fire-box. The radial expansion of the fire-box operates linkwork controlling the water-supply valve, and one of the links may carry an indicator moving over a temperature scale.



134,015.

134,144. Acetone and Carbonic Acid, Process for the Manufacture of. Société Anonyme des Acieries et Forges de Firminy, of Firminy, Loire, France. International Convention date (France), November 16, 1918.

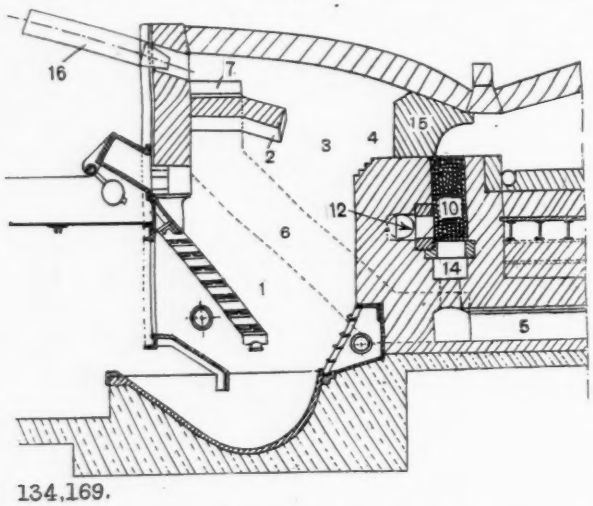
In connection with the process for manufacturing acetone by catalytic decomposition of acetic acid in contact with powdered manganese oxide, it is found that a better result is obtained by using precipitated manganese peroxide, or, still better, by using natural crushed pyrolusite. Pyrolusite crushed into small lumps, with or without coke, is packed into a refractory cylinder, and heated to 350° to 450° C. by passing an electric current through it. Acetic acid vapour is passed through the cylinder, and the acetone is condensed out of the resulting products. The residual carbon dioxide may be used for any desired purpose, and the catalyst may be regenerated by heating it in a current of air.

134,155. Hydrogen, Treating Spathic Iron Ore to render it suitable for use in the Manufacture of. W. J. Bates and W. R. Bates, Silverdale House, Silverdale, Staffs. Application date, March 13, 1919.

Raw ironstone is stacked in a heap, covered with a layer of small fuel, ignited, and allowed to burn slowly. The covering of fuel is maintained and the burning continued for eight or ten days, so that carbonaceous matter and sulphur are removed. Water is then applied to the hot material to break it up, and it is finally washed with water. The product is a purified ore which is very porous and of irregular surface.

134,169. Furnaces. H. Wade, London. (From Fours et Procédés Mathy Société Anonyme, 2, Rue des Dominicains, Liége, Belgium.) Application date, May 3, 1919.

The furnace is adapted to be heated either alternatively or together by (1) solid fuel, (2) liquid fuel, or (3) flameless combustion. Solid fuel is burned in the producer 1, and the gas is passed through the passages 3, 4, to the furnace hearth. Air is supplied from a recuperator through the passages 5, 6, to an opening 7 above the arch 2. This air may be used to burn either the producer gas, or alternatively liquid fuel injected through the nozzle 16, the block 15 being removed. When flameless heating is to be used the block 15 is replaced, and air and gas are supplied through the conduits 14, 12, respectively to the porous refractory material 10, where flameless combustion takes place.



134,169.

Note.—Complete specification 129,962 (cracking oils), which is now accepted and published, was abstracted when it originally became open to public inspection under the International Convention. (See The Chemical Age of September 27.)

International Specifications Open to Inspection

128,552. Aminobenzoic Ester Derivatives. Société Chimique des Usines du Rhone, anciennement Gilliard, P. Monnet et Cartier, 89, Rue de Miromesnil, Paris. International Convention date (France), June 20, 1918.

Aminobenzoic esters are heated with 1 to 2 molecular parts of ethylene oxide and small amounts of water and alcohol at 50° to 110° C. Mono- and di-β-oxyethyl-aminobenzoic esters of the formulæ

$$HO.CH_2.CH_2NHC_6H_4.COOR$$

and

$$(HO.CH_2.CH_2)_2N.C_6H_4.COOR,$$

where R is an alkyl radical, are thereby produced.

132,787. Evaporating and Crystallising. Aktieskapet De Norske Saltverker 30, Forvalmenning, Bergen, Norway. International Convention date, September 16, 1918.

The solution is circulated upwards through a tubular heater at one end of the evaporating vessel, where it is concentrated, and large crystals are deposited in a funnel adjoining. The liquid then passes downwards through a pump, and horizontally through a rotating paddle, to keep the smaller crystals in suspension, and so back to the tubular heater.

Latest Notifications.

135,206. Wool substitute from cellulose and similar solutions, Process for manufacturing. Glanzfaden Akt.-Ges. July 14, 1917.

135,214 and 135,217. Coke ovens. Soc. Anon. d'Ougree Marihaye. September 28, 1916.

135,216. Filtering apparatus for gaseous media. L. B. Fiechter. November 2, 1917.

Specifications Accepted, with Date of Application

114,617. Petroleum Pitch, Destructive Distillation of. K. Nomi. April 4, 1917.

121,727. Ammonium Perchlorate, Manufacture of. D. Aanensen. December 22, 1917.

123,522. Hydrocarbons, Rectification of. De Bataafsche Petroleum-Maatschappij and J. H. C. de Brey. February 21, 1918.

134,236. Carbonaceous Materials, Destructive Distillation of. F. M Perkin and Nitrogen Products and Carbide Co. February 19, 1918.

134,237. Ammonia and Ammonium Compounds, Process of Producing. G. G. Taylor and I. E. Knapp. March 13, 1918.

134,243. Hydrogen or Gases containing the same, Apparatus for Indicating and/or Recording Quantities of Carbon Monoxide in—applicable also for like purposes. E. K. Rideal and H. S. Taylor. June 4, 1918.

134,250. Benzyl Chloride and Benzal Chloride, Production of—and of certain homologues and substitution products of these Compounds. Levinstein, Ltd., H. Levinstein, and W. Bader. July 27, 1918

134,265. Cellulose, Fermentation of. Power Gas Corporation and H. Langweli. October 1, 1918.

134,270. Colouring-matters, Manufacture and Production of—and of Lakes therefrom. W. R. Brass. November 15, 1918.

134,313. Precipitates for Example Pigments, Formation of. F. G. Kidd, and Wilkinson, Heywood & Clark. October 30, 1918.

134,406. Retorts and Stills. J. Prentice. Decemebr 9, 1918.

134,415. Filter Press Plates. W. O. Mason. December 19, 1918.

134,422. Electric Furnaces. D. F. Campbell. December 23, 1918.

134,454. Gas Generators E. Svensson and M. A. Crank. February 11, 1919.

Patents Court Cases

Official notice is given of an application by R. T. Smith, 70, Lombard Street, London, E.C. 3, for a licence under the Trading with the Enemy (Amendment) Acts, 1916 and 1918, in respect of Patent 23,038/1011 (J. Gayley), relating to "Sintering of fine ore."

Professor Arthur R. Cushny, of the Chair of Materia Medica in Edinburgh University, delivered the inaugural address at a meeting of the North British branch of the Pharmaceutical Society of Great Britain, held in Edinburgh last Saturday. His subject was "The Properties of Optical Isomers from the Biological Side." Optical isomers, he explained, were substances which were practically identical when examined by ordinary chemical methods but differed in their relation to polarised light, and as shown by Pasteur, in their behaviour to the lower forms of life.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, November 27, 1919.

THE chemical market continues in a state of great activity and very good business has been reported during the current week. The trouble at the present time with many products is the difficulty of promising anything like prompt delivery.

Prices are extremely firm and in many cases with an upward tendency.

The export demand continues very strong, although enquiry has fallen off from Italy during the last few days owing to the domestic troubles in that country.

There is, however, more business offering than can satisfactorily be accommodated, and on the whole it is satisfactory to note that foreign buyers are now beginning to realise the inevitable and more inclined to place contracts for forward delivery.

General Chemicals

ACETONE.—There is slightly more activity in this product, but there is plenty of material available at the moment.

ACID ACETIC continues very firm, and available supplies are being steadily absorbed.

ACID CARBOLIC.—The demand continues active, and there is no change in price.

ACID FORMIC is in fair demand.

ACID OXALIC is very scarce on the spot, and price is again firmer. There is very little foreign material arriving.

ALUM is scarce for near delivery, and makers have advanced their price £1 per ton.

AMMONIUM SALTS are all very active, and makers are heavily sold.

ARSENIC is again higher, and exceptionally scarce for near delivery.

BARIUM SALTS are only moderately active, chloride being weak.

BLEACHING POWDER is in good request, but somewhat scarce, and is without change in price.

BORAX CRYSTALS are in active demand, and premiums have been paid for re-sale parcels on export account.

COPPER SULPHATE.—There is only a small demand, but price is a shade firmer.

EPSOM SALTS.—Makers are very heavily sold, and in most cases are unable to give delivery this year on new business.

FORMALDEHYDE remains almost unobtainable on the spot, and price nominal.

IRON SULPHATE (Green Copperas) is slow of sale, plenty of material being available.

LEAD ACETATE is not quite so active, but price is well maintained.

LEAD NITRATE is active, and price higher.

POTASSIUM BICHROMATE is moving off easily.

POTASSIUM CARBONATE.—There have been one or two arrivals of high-grade Russian material, but price remains high.

POTASSIUM CHLORATE is slow of sale.

POTASSIUM PRUSSIATE is firmer in price, and import licences are being sparingly granted for foreign material.

SODIUM ACETATE is without change, and moderate business is passing.

SODIUM BICARBONATE is wanted on export account, and is somewhat firmer.

SODIUM CHLORATE is only moderately active.

SODIUM CAUSTIC is again a turn higher, although perhaps there may not be quite such keen inquiry for export.

SODIUM HYPOSULPHITE remains steady at last quoted figure.

SODIUM NITRITE is scarce and firm on the spot.

SODIUM PRUSSIATE remains very scarce and high in price.

ZINC SALTS are moderately active, without change in value.

Coal Tar Intermediates

Business has been passing on a generous scale, and it is almost impossible to give prompt delivery on many products.

ANILINE OIL is very firm, and makers are well sold ahead.

ANILINE SALT remains very scarce and high in price.

BETA NAPHTHOL is badly wanted, but makers are unable to give near delivery on new business.

DIMETHYLANILINE is without change in price, with a moderate business passing.

PARANITRANILINE is exceedingly scarce for near delivery, without nominal change in price.

SALICYLIC ACID is more active than has been the case recently.

Heavy Coal Tar Products

The market continues firm and active.

BENZOL (90 per cent.).—Very little is available for export, and the home trade continues good, with prices unchanged.

CRESYLIC ACID.—There is still a good demand, and manufacturers are asking an advance, so that they are now sellers only at 2s. 9d. per gallon for 97-99 per cent., and 2s. 6d. to 2s. 7½d. per gallon for 95-97 per cent.

CREOSOTE OIL.—The demand continues active, and prices may be taken as 7½d. to 8d. in the South and 7d. to 7½d. per gallon in the North.

NAPHTHALENE.—The demand is fairly good, and prices are unchanged.

SOLVENT NAPHTHA.—There is still an active demand, and higher prices have been paid. To-day's quotations are 2s. 9d. to 2s. 10½d. per gallon.

HEAVY NAPHTHA.—There is a fairly good demand, and prices are quoted at 2s. 3d. to 2s. 4½d. per gallon.

PITCH.—Makers have advanced their pretensions, and are now asking 80s. f.o.b. East Coast, and 74s. to 76s. f.o.b. West Coast. London price is 87s. 6d. f.o.b.

Sulphate of Ammonia

There is still none available for export, and prices for home trade are unchanged.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	83	0	0	to	85	0	0
Acetic, 80% pure	ton	65	0	0	to	67	10	0
Carbolic, cryst. 39-40%	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	4	3	to	0	4	4
Formic, 80%	ton	105	0	0	to	110	0	0
Lactic, 50 vol.	ton	70	0	0	to	72	0	0
Lactic, 60 vol.	ton	85	0	0	to	87	10	0
Oxalic	lb.	0	1	2½	to	0	1	3
Acid, Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Tannic, commercial	lb.	0	3	3	to	0	3	6
Tartaric	lb.	0	3	2	to	0	3	3
Alum, lump	ton	19	0	0	to	19	10	0
Aluminium, sulphate, 14-15%	ton	15	0	0	to	15	10	0
Aluminium, sulphate, 17-18%	ton	18	10	0	to	19	0	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	6½	to			
Ammonia, muriate (galvanisers)	ton	44	0	0	to	45	0	0
Ammonia, nitrate	ton	45	0	0	to	50	0	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Arsenic, white, powdered	ton	60	0	0	to	62	0	0
Barium, carbonate, 92-94%	ton	13	0	0	to	14	0	0
Chloride	ton	21	0	0	to	22	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	17	10	0	to	18	0	0

	per	£	s.	d.		£	s.	d.
Borax crystals	ton	39	0	0	to	40	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Chloride	ton	9	0	0	to	9	10	0
Casein, technical	ton	80	0	0	to	83	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper sulphate	ton	40	0	0	to	41	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde 40% vol	ton		—			165	0	0
Iron perchloride	ton	40	0	0	to	42	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	83	0	0	to	85	0	0
Carbonate (White Lead)	ton	53	0	0	to	55	0	0
Nitrate	ton	62	0	0	to	63	0	0
Lithophone, 30%	ton	44	0	0	to	46	0	0
Magnesium chloride	ton	15	0	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	11	10	0	to	12	0	0
Sulphate (Druggists')	ton	17	10	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	105	0	0	to	107	0	0
Potassium Chlorate	lb.	0	1	2	to	0	1	3
Meta-bisulphate, 50-52%	ton	235	0	0	to	245	0	0
Nitrate, refined	ton	60	0	0	to	62	0	0
Permanganate	lb.	0	3	3	to	0	3	6
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	1	11	to	0	2	0
Sulphate 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	10	0	to		—	
Seconds	cwt.	4	5	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	9	10	0	to	10	0	0
Bisulphate, 60-62%	ton	32	10	0	to	33	10	0
Chlorate	lb.	0	0	6	to	0	0	6½
Caustic, 70 %	ton	25	10	0	to	26	10	0
Caustic, 76 %	ton	26	10	0	to	27	0	0
Hyposulphite, commercial	ton	19	10	0	to	20	0	0
Nitrite, 96-98%	ton	61	0	0	to	62	0	0
Phosphate, crystal	ton	32	0	0	to	35	0	0
Prussiate	lb.	0	1	1	to	0	1	1½
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	22	10	0	to	23	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	38	0	0	to	40	0	0
Tin perchloride, 33%	lb.	0	2	4	to	0	2	5
Protochloride (tin crystals)	lb.	0	1	9	to	0	1	10
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Sulphate	ton	21	10	0	to	23	0	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	7	to	0	2	9
Aniline oil, drums free	lb.	0	1	3	to	0	1	4
Aniline salts	lb.	0	1	8	to	0	2	0
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	6	to	0	7	0
Benzidine, base	lb.	0	6	6	to	0	7	0
Benzidine, sulphate	lb.	0	5	6	to	0	6	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	9	to	0	3	0
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	7	6
Dinitrobenzol	lb.	0	1	2	to	0	1	3
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	7	to	0	1	8
Dinitrophenol	lb.	0	1	3	to	0	1	6
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	11	6	to	0	12	0
Metaphenylenediamine	lb.	0	4	9	to	0	5	0
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2 :7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	3	3	to	0	3	6
Naphthionate of Soda	lb.	0	4	0	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	3
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6
Paranitrophenol	lb.	0	1	10	to	0	2	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	9	0	to	0	10	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	2	9	to	0	3	9
Salol	lb.	0	4	9	to	0	5	6
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	3	to	0	1	0
Tolidine, base	lb.	0	9	6	to	0	10	6
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Alsatian Potash Imports.

IMPORTS for the week ending November 22, 885 tons Sylvinite 14 per cent. Prices:—Sylvinite 14 per cent. (French Kainit), £7 per ton; Sylvinite 20 per cent. (French Potash Salts), £8 7s. 6d. per ton; Muriate of Potash 80 per cent., £19 7s. 6d. per ton.

Chemical Contract Dispute

AN appeal against an arbitration award was heard by Mr. Justice Coleridge and Mr. Justice McCardie, in the King's Bench Divisional Court, on Thursday, November 20, when Messrs. T. Watson & Co., chemical and general manufacturers, of Eldon Street, London, asked that an award made in favour of Messrs. Mann & Cook, of St. Michael's Alley, Cornhill, with respect to contracts for the sale of sulphate alumina, should be set aside.

Mr. A. Powell, who appeared for the appellants with Mr. P. R. Simner, said that the appeal was based on the alleged erroneous conduct of the arbitrators, who, they said, rushed through matters, with the result that the applicants suffered badly. There were two contracts for the sale of sulphate alumina, one for 50 tons and one for 40 tons, at £10 5s. per ton. The contracts were made in February, 1918, and delivery was to be made between February and May, 1918. These contracts were subject to certain conditions which seemed to have been ignored by the arbitrators. The goods were ordered by Watson & Co. from a man named Taylor, who was to get them from manufacturers called Pochin & Co., of Manchester. Messrs. Mann & Cook were the purchasers. The goods were not forthcoming, and Messrs. Mann & Cook bought against Watson & Co. at a much higher price, and claimed that they were entitled to the difference as damages. The arbitrators awarded them £517 10s. damages. This sum, observed counsel, would have been somewhere near the mark if there had been no conditions, but these were not gone into by the arbitrators. Messrs. Watson & Co. put the matter into the hands of their solicitors and expected to get due notice of the arbitration, but they only received an intimation that the arbitration was to be held an hour before it took place.

After legal argument the parties agreed that the matter should be referred to Mr. George Wallace, K.C., as sole arbitrator.

Deal in Palm Oil Soap

ON Thursday, November 20, in the Commercial Court, King's Bench Division, Mr. Justice Roche had before him an action by Mr. Alfred Beer, a merchant carrying on business at Cairo, against Messrs. A. Wilson & Co., export merchants, of Great Tower Street, E.C., to recover damages for alleged breach of contract for the non-delivery of palm oil soap. Plaintiff received from the defendants a circular in October, 1914, which stated that they were able to supply all sorts of things, including soap. Plaintiff wrote asking for a firm offer until March, 1915, and defendants made a quotation of 30s. 3d. per box. In February, 1915, plaintiff alleged that he placed an order with defendants on the terms of the quotation for 68,800 boxes of soap. Plaintiff thereupon obtained a contract to supply the Egyptian Government with the soap. Defendants had failed to make delivery, and plaintiff had lost his profit on the transaction and had had to pay the Government the loss they had sustained in having to purchase elsewhere at a higher price. The defence was that the parties never came to a concluded bargain on the matter.

His lordship gave judgment for defendants, holding that defendants never were bound by any concluded agreement.

Company News

CASTNER-KELLNER ALKALI.—Final dividend of 7 per cent., making 13 per cent. for the year ended September 30. A year ago the total dividend was 20 per cent.

BRITISH OIL AND CAKE MILLS.—The profit and loss account for the year 1918, after writing off £30,000 for depreciation, transferring £5,000 to the staff pension fund, placing £49,441 to reserve (which together with £130,559 premium on the last issue of Ordinary shares, makes a total addition to reserve account of £180,000) shows a credit balance of £217,567. The Ordinary share dividend of 15 per cent. absorbed £174,766 and £17,569 is carried forward. It is proposed to duplicate the Ordinary share capital by offering shareholders at par one new share for every Ordinary share held.

BRITISH OIL & CAKE MILLS.—At an extraordinary general meeting held subsequent to the twenty-first ordinary general meeting, on Wednesday, a resolution was carried to increase the capital of the company from £2,000,000 to £10,000,000 by the creation of 8,000,000 new shares of £1 each.

CASSEL CYANIDE.—The directors recommend a final dividend of 1s. 6d. per share, making 2s. per share for the year, less tax at 6s. per £, payable December 22, to holders on the books December 3.

COLONIAL GAS.—The report for the year to June 30 last states that the profit amounts to £18,569, and £3,363 was brought in, making £21,932. After providing for debenture and other interest, for renewals and depreciation, and for the dividend on the Preference shares, the directors recommend a dividend on the Ordinary shares of 7 per cent., less tax, for the year, carrying forward £5,607.

INTERNATIONAL LIGHT & POWER.—After providing for debenture interest and sinking fund, administration expenses in London and Canada, and interest on loan, the net profits amount to £28,939; adding the balance of £34,099 brought forward, less accrued Preference dividends paid of £33,904, the accounts for the year to June 30 last show a profit of £29,134; after deducting Preference dividends for the year of £12,757 and placing £2,500 to reserve for contingencies, there remains a credit balance of £13,877, which the directors recommend be carried forward.

BRITISH COTTON & WOOL DYERS' ASSOCIATION.—The profits for the past half-year amounted to £90,414, and £38,160 was brought forward. To depreciation fund, £12,500; no interim dividend is declared, the balance of £91,371 being carried to the final half-year. The directors recommend the capitalisation of £193,541 of reserve and to distribute 774,164 new Ordinary shares of 5s. each to the holders, being one for every two held.

ZUNGON TIN SYNDICATE.—Dividend at the rate of 5 per cent. per annum for the half-year to June 30, payable on December 15.

WEARDALE LEAD.—The profit for the year to September 30 last including interest, dividends on investments, &c., is £12,736, or, less tax, £7,421, making together with the balance brought forward from September, 1918, £11,800. Out of this sum an interim dividend of 6d. per share has been paid amounting to £2,448, leaving a balance of £9,352. The directors recommend that this sum be appropriated as follows: To pay a final dividend of 1s. per share, free of tax, making, with the interim dividend already paid, 7½ per cent. for the twelve months, which will absorb £4,896, carrying forward £4,456.

TRINIDAD CENTRAL OILFIELDS.—At an extraordinary general meeting, held in London last week, Mr. Alexander Duckham moved a resolution for increasing the capital to £1,350,000 by the creation of 1,000,000 additional Ordinary shares of £1. On a show of hands the resolution was lost, but it was carried on a poll by 121,727 votes with only 1,620 against.

ANGLO-PERSIAN OIL.—The directors have decided to issue £8,600,000 new capital, of which £3,000,000 in Ordinary shares will be allotted to the British Government and the Burmah Oil Co., and £3,000,000 Preference shares, being minimum dividends of 6 per cent. and maximum 8 per eent. will be offered at 23s. per £1 share, while £2,600,000 5 per cent. Debentures will be issued at 85 per £100 bond.

BROKEN HILL PROPRIETARY.—The net profit for the half-year ended June 30, after charging ali administration expenses, allowin for depreciation, making provision for income tax claims in England and Australia, and appropriation jor new plant, &c., was £65,582, which, with the blance brought forward, makes a total of £149,537.

NORTH LONSDALE IRON AND STEEL.—Final dividend of 9½ per cent. (actual), making 14 for the year.

BELL'S UNITED ASBESTOS.—The directors announce an issue of 110,000 Ordinary shares of £1 each, increasing the issued Ordinary share capital from £140,000 to £250,000. The price of issue has been fixed at 27s. 6d. per share. Theie are now offered to shareholders 96,000 of these shares in the proportion of three new Ordinary shares for every five Ordinary shares held, and one new Ordinary share for every five 6 per cent. Preference shares held. The balance of 14,000 shares is reserved for issue to employees, customers, &c.

JURGENS, LTD.—Applications are invited for an issue of 1,500,000 (Guaranteed) Seven per Cent. Cumulative Participating Preference shares of £1 each at 21s. per share. The dividend is guaranteed by the Anton Jurgens' United (Margarine Works) of Oss, Holland. The object of the present issue is to provide funds for further working capital for Jurgens, Ltd., and for the payment up of the 1,000,000 twelve-and-a-half per cent. Cumulative Participating Preference shares of Olympia Oil and Cake Company subscribed by Jurgens, Ltd., upon which 1s. per share has been paid on application. The directors of the Dutch Company state that the net profits for 1919 will exceed those of last year.

CHARLES KINLOCH & CO., LTD.—A petition, in accordance with a resolution already passed, to reduce the capital from £130,000, divided into 30,000 Preference shares of £1 each and 100,000 Ordinary shares of £1 each to £100,000, divided into 100,000 Ordinary shares of £1 each is directed to be heard before Mr. Justice Astbury on December 5.

"SHELL" TRANSPORT & TRADING.—Holders of share warrants to bearer are informed that an interim dividend of 2s. per share, free of tax, in respect of 1919 will be payable at Lloyds Bank (Capital and Counties Branch), 39, Threadneedle Street, on and after January 5. The coupon to be presented is No. 33, which must be left at the bank three clear days. It is also notified that the Ordinary share transfer books will be closed from December 15 to 24 for the preparation of dividend of 2s. per share, free of tax, payable January 5. The dividend will be paid to holders registered December 13.

AMALGAMATED ZINC (DE BAVAY'S).—During the half year to June 30, the profit on working account was £39,106, including £22,782 increased profit from adjustments in respect of previous periods. The balance to the credit of appropriation account at December 31 was £14,454, to which add £44,359 transferred from profit and loss account, making £58,813, out of which dividend No. 28, paid April 16, absorbed £25,000, £9,744 was transferred to reserve for depreciation, and £24,069 was transferred to equalisation reserve.

W. H. Dorman & Co., Ltd.

WE learn that this company, who are specialists in the designing and building of internal combustion engines for petrol or paraffin, makers of the C. C. Interrupter Gear, and exclusive licencees for the manufacture in the United Kingdom of a series of portable percussion and rotary tools under a number of patents protecting the wave system for transmission of power through liquids, the inventions of Mr. George Constantinesco, will shortly offer for subscription 250,000 8 per cent. Cumulative Participating Preference shares at £1 each, and 50,000 Ordinary shares at £1 each. The business was founded in 1870, and the present company was formed in 1897 to acquire, develop and extend it. The objects are (1) The designing and building of Dorman Internal Combustion Engines for petrol or paraffin, for pleasure cars, commercial lorries and agricultural tractors. (2) The designing and building of self-contained Portable Electric Lighting Sets for petrol or paraffin. (3) The manufacture of an important series of Printing Machines. (4) The manufacture of Machine Tools for use in engineering shops. The orders on the books at present total over £800,000 in value. No part of this issue has been or will be underwritten.

A New Refractory Material

WE have recently had brought to our notice a new high-grade refractory material which is being put on the market under the name of Thermonite and which, we understand, was used at one of the Government mills during the war for the protective lining of gas-fired crucible furnaces, with highly satisfactory results. The life of the linings so treated proved to be eight to ten times that of the ordinary lining. The material is claimed to be free from unequal expansion and contraction, contains no free carbon, and has a conductivity of about four to five times that of fire brick. These qualities render the material well suited for the manufacture of crucibles and similar articles, and this is now being undertaken. Pots made of this material are suitable for the melting of all metals and many other substances. It withstands most slags and all ordinary fluxes except borax. Being free from unequal expansion and contraction it can be subjected to sudden heating and cooling without danger of cracking; in fact, pots have been raised to a white heat and dropped into cold water several times without fracture. Being capable of resisting temperatures well over 2,000 deg. C. the material should have an extensive market as a protective lining to such parts of furnaces as are subjected to temperatures above that at which fire brick fails. Being very hard it is capable of withstanding heavy wear.

Colnbrook Chemical and Explosives Co.

THE statutory meetings of creditors and shareholders in the liquidation of this company were held on Tuesday at Bankruptcy Buildings, Carey Street, W.C., the statement of the company's affairs showing a total deficiency of £54,464 17s. 9d.

Mr. W. J. Warley, Assistant Official Receiver, who presided, said that the usual report on the company's affairs had already been sent to the creditors and shareholders and the only business before the meeting was the appointment of a Liquidator and committee of inspection.

After some discussion both meetings decided to leave the liquidation in the hands of the Official Receiver, and appointed the following committee of inspection:—Mr. Cooper (J. R. Wells & Co.), Mr. Messer (The Wraysbury Chemical Works, Ltd.), Mr. Rogers (Heron, Rogers & Dehn), Mr. Manville and Mr. Goodwin (Oscar Goodwin & Co.).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE.

Partnership Dissolved

PAIN, Edwin, and PAIN, Allan Walter, chemists and opticians, 52, High Street, Sevenoaks, under the style of Pain & Powell, by mutual consent as and from July 1.

Liquidators' Notices

TRINIDAD OIL LEASES, LTD.—A general meeting of members will be held at Finsbury Pavement House, Finsbury Pavement, London, on December 23, at 12 noon. W. M. Cambi, Liquidator.

SOUTHAM HEMATITE CO., LTD. (in Voluntary Liquidation).—A general meeting will be held at St. Nicholas Chambers, Whitehaven, on Monday, December 22, at 11 a.m. Wm. Reed, Liquidator.

LITTLER CONCRETE CO., LTD. (in Liquidation).—A general meeting of members will be held at the office of the Liquidator, 22, Lord Street, Liverpool, on Monday, December 29, at 2.30 p.m. C. H. Mitchell, Liquidator.

NORTHERN DYES & CHEMICALS CO. (MANCHESTER), LTD.—A general meeting will be held at the offices of C. H. Travis & Co., Chartered Accountants, 6, John Dalton Street, Manchester, on December 29, at 3 p.m. B. A. Fitzgerald, Liquidator.

THE COVENTRY CONCRETE CO., LTD.—Creditors' claims on or before December 20 to H. Harrison, Avenue House, Edgewick, Coventry.

Companies Winding up Voluntarily

WEST HARTLEPOOL CHEMICAL MANURE CO., LTD.—Mr. Edward Heslop, 200, York Road, West Hartlepool, Accountant, appointed Liquidator. Meeting of creditors at the offices of Messrs. Turnbull & Tilly, Solicitors, 13, Church Street, West Hartlepool, Durham, on Friday, December 5, at 11 a.m. Creditors' claims on or before December 31 to the Liquidator.

SILVERTON OIL CO., LTD.—Mr. Henry Edward Sweeting, 4, Charles Street, Cardiff, Chartered Accountant, appointed Liquidator. Meeting of creditors at 4, Charles Street, on Monday, December 1. Creditors' claims on or before November 24 to the Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, created after July 1st, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

Satisfaction

PARK CHINA CLAY CO., LTD., ST. DENNIS.—Satisfaction registered November 13, £3,000, registered July 13, 1908.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd, company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

BLAKEY & GLOVER, LTD., Allen Brigg Mills, Pudsey, Yorks.—Tanners and curriers. Nominal capital, £50,000 in 20,000 Preference shares of £1 each and 30,000 Ordinary shares of £1 each. Directors: J. Blakey, Rochville, Cemetery Road, Pudsey; J. Glover, 9, Cemetery Road, Pudsey. Qualification of Directors, £200. Remuneration of Directors to be voted by Company in general meeting.

JOHN PARSONS & CO., LTD., 31, Water Street, Manchester.—Glass bottle manufacturers and merchants. Nominal capital, £10,000 in 5,000 7 per cent. Cumulative Preference shares and 5,000 Ordinary shares of £1 each. Directors: J. Parsons, "Vernon Villa," Vernon Street, Lower Broughton; Jennie Parsons, "Gledholt," 332, Lower Broughton Road, Manchester; Gladys B. Parsons, "Vernon Villa," Vernon Street, Lower Broughton. Qualification of Directors, £1.

KOFOH CO., LTD., 2, Friar Street, Liverpool. Wholesale manufacturing chemists and druggists. Nominal capital, £2,000 in 2,000 shares of £1 each. Directors: D. Norman, 269, Crosby Road, Seaforth; J. Oates, 269, Crosby Road, Seaforth; G. W. Black, 36, Moss Grove, Liverpool. Qualification of Directors, 1 share.

LANDS (WHOLESALE), LTD., 30A, High Street, Coalville, near Leicester.—Chemists, druggists, drysalters, oil and colourmen. Nominal capital £5,000 in 5,000 shares of £1 each. Director: J. H. M. Land (Governing Director). Qualification of Directors, 1 share. Governing Director, 100 shares.

MAJUNGA OILFIELDS OF MADAGASCAR, LTD., Clifford Chambers, 10, New Bond Street, W. 1.—To acquire oil or other mines, mining or prospecting rights and oil-bearing or metalliferous land in the Island of Madagascar or elsewhere and turn same to account. Nominal capital, £200,000 in 200,000 shares of £1 each. Minimum subscription, £15,000. Directors: R. B. McNeily, 346, Dashwood House, 9, New Broad Street, E.C.; E. S. G. Greene, 10, New Bond Street, W. 1; A. V. Ireland, 50, Claverton Street, S.W. 1; W. S. Forbes, St. Nicholas, New Road, Richmond; J. Martin, 50, Claverton Street, W. 1. Qualification of Directors other than first Directors, £500. Remuneration of Directors, £200 each.

NICOL RULE & CO., LTD., The Orchard Works, Yiewsley, Middlesex. Manufacturers of chemicals. Nominal capital, £1,000 in 20,000 shares of 1s. each. Directors: F. H. Haynes, 25, Denmark Avenue, Wimbledon; S. P. Larkworthy, 35, Belsize Avenue, Hampstead. Qualification of Directors, 1 share.

PLUMBEX, LTD., 3, Lawrence Pountney Hill, E.C.—Chemists, pharmacists, druggists, &c. Nominal capital, £15,000 in 12,000 Preference shares of £1 each, and 60,000 Deferred shares of 1s. each. Directors: A. Spurrier, K. S. Lowe, R. D. Mackintosh. Qualification of Directors, 2,000 shares. Remuneration of Directors, £400 each.

RUBBER AND TIN ESTATES, LTD., West Africa House, Water Street, Liverpool.—To acquire tin and other mines and turn same to account. Nominal capital, £10,000 in 10,000 shares of £1 each. Minimum subscription, £500. Directors: F. Hilditch, "Mandeville," Freshfield, Lancaster; C. G. Ogolvie, "Delvine," Murthly, Perthshire. Qualification of Directors, £100.

SAFETY CELLULOID CO., LTD., Abbey Road, Park Royal, Willesden, N.W. 10.—Manufacturers of celluloid sheets, chemical manufacturers and leather dressers. Nominal capital, £200,000 in 200,000 shares of £1 each. Minimum subscription, 10 shares. Directors: C. J. Small, 33, Priory Avenue, Hastings; A. Reid, 7, Trouville Road, Clapham Park, S.W. 4; W. Barton, 33, Gorst Road, Wandsworth Common, S.W. 12; S. W. Copley, Deasons Hill, Elstree, Herts; F. Williams, The Poplars, Wickford, Essex. Qualification of Directors, £100.

WINNEBAH TINFIELDS, LTD., 17, Farringdon Avenue, E.C.—To acquire and develop tin, iron, coal and other mines. Nominal capital, £100 in 200 shares of 10s. each. Directors: S. Lee, 12, Chester Terrace, N.W.; M. L. J. Browne, Oldhunt, Horsall, Surrey. Qualification of Directors, 1 share

WESTERN COUNTIES CLAY CO., LTD., Masonic Buildings, South Street, St. Austell, Cornwall.—Producers, manufacturers and dealers in china, clay, china stone building, stone and bricks. Nominal capital £30,000 in 30,000 shares of £1 each. Directors: E. J. Hancock, "Trecarne," Newquay, Cornwall; R. R. French, "Belfield," St. Austell, Cornwall; T. S. Donne, Milbrook House, Castle Carey, Somerset; D. Phillips, "Trewson," St. Austell, Cornwall. Qualification of Directors, £300. Remuneration of Directors, £50 each.